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Bank Risk Taking and Deposit Insurance Premium: Comparison Between Islamic and Conventional Bank

Field of Study: Finance

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ABSTRACT

Liquidity assistance is provided for under the lender of last resort facility for solvent banks. Nevertheless, deposit insurance is a depositors' protection tool to sustain depositors' confidence in the banking system and to ensure there is financial stability in the market. Similar to other types of insurance, deposit insurance suffers from the moral hazard problem. Aptly, a credible design feature of deposit insurance coupled with prudential regulation and supervision would limit this problem. For this reason, this thesis aims to investigate three objectives related to the moral hazard problem associated with deposit insurance.

The first objective is, to investigate the presence of moral hazard by way of increase in bank risks through credit risk, insolvency risk and operational risk. Secondly, is to compare the changes in bank risk, both in the conventional and Islamic banks post deposit insurance. The last objective is to examine the credibility of the risk based deposit insurance premium in mitigating the moral hazard problem. To overcome the endogeneity problem in panel data, instrumental variables that are the lagged explanatory variable in a dynamic panel data methodology are used. Specifically, this thesis employs the System Generalized Method of Moment (GMM) estimator. Based on literature, System GMM has the least biased estimator among other alternatives. The sample includes all the mandatory members (conventional and Islamic banks in Malaysia) of deposit insurance protection over the period 2002-2010.

To achieve the first and second objectives, this thesis used unbalanced panel data for the all banks sample and Islamic banks sample while the panel data is balanced for conventional banks. During the financial crisis 2007/2008, Islamic banking grew in importance as an

alternative to conventional banking that appeared riskier than the Islamic banks. However, the impact of deposit insurance system on Islamic banks has not been analyzed as rigorously as that on conventional banks. For the all banks sample, the main findings are that the bank risk through insolvency risk and operational risk is significant and positively associated with the introduction of a deposit insurance system. Specifically, it provides new insights into various implications of deposit insurance on Islamic banks risk taking. This study includes new empirical evidence on operational risk taking by conventional banks post deposit insurance system.

An important aspect of the new financial landscape is the increased focus on financial stability. A deposit insurance system accomplishes this purpose with the deposit insurance premium exerting as an important tool in mitigating the moral hazard problem. This leads to the final objective of this study. The banks' annual premium amounts are estimated to determine whether the premium is sensitive towards bank risk in the risk-based premium. This thesis provides very strong evidence that risk-based deposit insurance does not necessarily mitigate the moral hazard problem unless the quantum of risk-premium is adequate to cover the increased risk. Therefore, this thesis offers not only the understanding of the deposit insurance concept and theory but also provides new insights based on original empirical evidence. The results have several important policy implications.

ABSTRAK

Bantuan kecairan disediakan sebagai sumber pemberi pinjam terakhir bagi bank mampu bayar, walau bagaimanapun Insurans Deposit (ID) menjadi satu mekanisme perlindungan bagi pendeposit untuk mengekalkan keyakinan mereka terhadap sistem perbankan, selain dari memastikan bahawa wujudnya kestabilan kewangan dalam pasaran. Secara kasarnya, seperti jenis-jenis insurans yang lain, ID turut terjejas disebabkan masalah bahaya moral. Namun begitu, ID yang mempunyai ciri reka bentuk yang berkredibel, ditambah pula dengan peraturan dan penyeliaan penuh cermat, akan mengekang masalah ini. Oleh itu, tesis ini bertujuan untuk menyiasat tiga objektif yang berkaitan dengan masalah bahaya moral pasca ID.

Objektif yang pertama adalah untuk menyiasat sama ada wujud bahaya moral dalam bentuk peningkatan risiko menerusi risiko kredit, risiko ketaksolvenan, dan risiko operasi. Objektif kedua adalah untuk membanding perubahan dalam risiko antara bank perdagangan dengan bank Islam. Objektif terakhir adalah untuk mengenal pasti sama ada premium ID berupaya mengurangkan masalah bahaya moral.

Untuk mengatasi masalah *endogeneity* dalam data panel, pemboleh ubah instrumen yang juga merupakan pemboleh ubah penjelas terlat di dalam kaedah data panel dinamik digunakan. Khususnya, tesis ini menggunakan penganggar *System Generalized Method of Moment* (SGMM). Berdasarkan kajian, SGMM dianggap sebagai penganggar yang paling tidak bias dalam kalangan alternatif yang ada. Sampel dalam kajian ini termasuklah semua ahli wajib (bank perdagangan dan bank Islam di Malaysia) bagi perlindungan ID dalam tempoh 2002 hingga 2010.

Untuk memenuhi objektif pertama dan kedua, tesis ini menggunakan data panel tak seimbang bagi semua sampel bank dan sampel bank Islam, sementara data panel seimbang digunakan bagi sampel bank perdagangan. Ketika krisis kewangan yang berlaku pada tahun 2007/2008, perbankan Islam berkembang sebagai alternatif bagi perbankan perdagangan yang didapati lebih berisiko berbanding bank Islam. Namun begitu, kesan daripada sistem ID terhadap bank-bank Islam masih belum dianalisis sekerap bank perdagangan.

Bagi semua sampel bank, dapatan utama yang diperoleh menunjukkan bahawa risiko bank melalui risiko ketaksolvenan dan risiko operasi didapati signifikan dan secara positif berkait dengan pengenalan sistem ID. Dapatan ini khususnya memberi penemuan baharu berkenaan implikasi berbeza yang dibawa oleh ID terhadap amalan pengambilan risiko oleh bank Islam. Kajian ini turut menemukan bukti empirikal baru berkenaan amalan pengambilan risiko operasi terhadap bank perdagangan pasca ID.

Satu aspek penting dalam landskap kewangan baru adalah perhatian yang meningkat terhadap kestabilan kewangan. Sistem ID menyelesaikan hal ini dengan premium ID yang digunakan sebagai satu mekanisme untuk menangani masalah bahaya moral. Hal ini membawa kepada objektif ketiga dan terakhir kajian ini. Kajian ini menganggarkan premium tahunan bagi pihak bank untuk mengukur kredibiliti premium ID.

Tesis ini memberi bukti yang amat kukuh bahawa premium yang berasaskan risiko tidak semestinya polisi yang efektif untuk membendung masalah bahaya moral. Justeru, tesis ini bukan sahaja memberi pemahaman mengenai konsep dan teori ID, malah ia turut membawa penemuan baru berdasarkan bukti empirikal yang sah. Keputusan daripada kajian ini mempunyai beberapa implikasi penting terhadap polisi.

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Chapter 1 : Introduction

1.1 Research Background

In the academic literature on seminal theoretical framework by Diamond and Dybvig (1983), it was argued that deposit insurance prevents bank runs by depositors or market liquidity failures that are compared to a bank run. Despite this, the empirical result of the study or other studies is mixed. Several past empirical studies reported that deposit insurance has a negative impact, as it motivates banks to increase their risk-taking that could lead to a likelihood of banking crisis (e.g. Demirguc-Kunt & Huizinga, 2004; Demirguc-Kunt, Kane & Laeven, 2008; and DeLong & Saunders, 2011). Their findings showed how explicit deposit insurance may enhance the moral hazard problem. In other words, an explicit deposit insurance system might provoke financial instability by exacerbating bank risk taking by way of enhancing the moral hazard problem.

Nevertheless, some studies reveal that the introduction of deposit insurance system could actually bring about positive impacts to an economy. A recent study by Chernykh and Cole (2011) on Russian banks suggested that the deposit insurance system promotes banks' deposits and thus improves the country's financial intermediation. Similarly, Maysami and Sakellariou (2008) find that implementing the deposit insurance system in countries that have a well-developed and liberalized banking system would probably reduce the occurrence of a banking crisis.

The study on the impact of the introduction of financial safety nets in particular deposit insurance system, has received major attention by academic scholars. The majority of these

studies, however, were conducted based on cross-country analysis for developed and developing countries. Little research has been done on country specific, in particular developing country, despite a steady increase in the number of emerging or developing economies (including Malaysia) implementing explicit deposit insurance since 1974 (see Demirguc-Kunt, Kane, & Laeven, 2008; and Demirguc-Kunt & Sobaci, 2001). Each specific country has different governance structure and institutional environments. For instance, some countries have many state-owned banks operating in the financial market while others have Islamic and conventional banks operating on a parallel basis. These institutional differences matters do influence the efficacy of regulatory policies, particularly for the deposit insurance policy. Interestingly, no study has investigated the impact of deposit insurance on the Islamic banks in a dual banking system[1] as well as examined in depth the deposit insurance premium sensitivity towards bank risk in mitigating the moral hazard problem. This thesis endeavors to fill these gaps in the existing deposit insurance literature.

Typically, based on the literature, the general findings and research gaps identified are as follows:

(a) Most studies on deposit insurance system agree that an explicit deposit insurance has a negative impact, which is likely to motivate banks to increase their risk taking by way of moral hazard. These studies include those by DeLong & Saunders, 2011; Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011; Forssbaeck, 2011; Ioannidou & Penas, 2010; Tuan, Ying, & Nya, 2010; Angkinand, 2009; Demirguc-Kunt, Kane & Laeven, 2008; Yilmaz & Muslumov, 2008; Demirguc-Kunt & Huizinga, 2004; Demirguc-Kunt &

[1] In a dual banking system, a country operates conventional banking as well as Islamic banking complementarily. Added to that a county operating in a dual banking system like Malaysia have both conventional and Islamic deposit insurance system to protect the conventional and Islamic deposits respectively.

Detragiache, 2002; and Baer & Brewer, 1986. On the contrary, Gropp and Vesala (2004) study showed that the establishment of explicit deposit insurance could significantly reduce the risk taking of banks. Likewise, the overall results of Karels and McClatchey (1999) provided strong evidence that deposit insurance did not lead to increased risk-taking in the credit union industry.

Although Demirguc-Kunt and Detragiache (2002) found that an explicit deposit insurance system in countries with weak institutional environments is likely to lead a banking crisis, they also argued that introducing an explicit deposit insurance system "may create the basis for a more developed banking system that performs more financial intermediation"(p.1403). Other recent studies maintain that explicit deposit insurance brings about increased financial intermediation (Chernykh & Cole, 2011; Sargent, 2011; and Cull, Senbet, & Sorge, 2005) of the banking system. Similarly, Maysami and Sakellariou (2008) found that implementing the deposit insurance system in countries that have a well-developed and liberalized banking system would probably reduce the occurrence of the banking crisis, hence providing financial stability (DeLong & Saunders, 2011). Likewise, the evidence on the benefits of deposit insurance is also reflected in Angkinand (2009). Hence, empirical results on the implication of a deposit insurance system regulation are still inconclusive.

(b) It is clear from the literature that the empirical studies sampling frame only includes conventional banks in the data analysis whereas the presence of Islamic banks in some of the countries have been excluded from the analysis. For instance, Indonesia is the world's populous Muslim country with nearly 90% or 220 million Muslims. Notably, Hadad et al. (2011) ignored the four Indonesian Islamic banks in their study but only included 104 Indonesian conventional banks over a period from 1995 to 2009, despite Indonesia

implementing a dual banking system (i.e. Islamic and conventional banking) and having an Islamic deposit insurance covering the Islamic deposits in the country.

With the increasing importance of Islamic banking, it is overwhelming that the impact of deposit insurance on the Islamic banks has not yet been analyzed as rigorously as the conventional banks. Of the 19 countries that have an Islamic banking system, only 10 countries including Malaysia, have set up an Islamic deposit insurance system (International Association of Deposit Insurers, 2010). However, among these 10 countries only Malaysia has an Islamic deposit insurance system in a dual banking environment that is operated by a government owned deposit insurer and is regulated under specific legislation. Today, the consumers of Islamic banking are not only the world's 1.6 billion Muslims but also people of other faiths.

(c) The distinct design features in other country specific empirical studies like Russia, Indonesia and Bolivia are the deposit insurance premium assessment method. The deposit insurance premium could be either a flat rate premium or a risk-based premium. Members bank pay comparable premium under a flat rate while the risk-based premium incorporates bank risk in the premium structure. Malaysia started with the flat rate premium in the first two years of the deposit insurance period before transforming to risk-based premium structure in the year 2008. In contrast, the three countries mentioned above continue to adopt the flat rate system until now. The question lies not only to have a deposit insurance system in place that protects depositors but a credible deposit insurance with premium that is sensitive towards bank risk in mitigating the moral hazard problem and thereafter promoting prudent risk management among banks. Particularly, the risk- based premium in contrast to a flat rate premium exerts an important function in mitigating moral hazard problem to ensure financial stability.

Hence, this study investigates whether the magnitude of risk-based deposit insurance premium paid (estimated with modification) is positively associated with bank risk in addition to whether the risk-premium sensitivity significantly improves in the risk-based premium assessment method (flat rate versus risk-based). These two conjectures indicate an effective deposit insurance premium to mitigate the moral hazard problem. The findings of this study would provide important insights for regulators especially with the dual banking system, in developing policies to strengthen the deposit insurance premium design feature[2] to curb the moral hazard problem.

(d) A review of the literature suggests that most studies that examine the impact of deposit insurance focus largely on assessing the cross-country evidence. During the past two decades, there is a lack of empirical material on bank level data to examine the cost and benefits of deposit insurance (Chernykh & Cole, 2011). Moreover, very few empirical studies on deposit insurance in the past five years examine bank-level data on banking in developing countries for evidence on the impact of the introduction of an explicit deposit insurance system. For example, Chernykh and Cole (2011) conducted a study on Russian banks while Ioannidou and Penas (2010) did a study on banks in Bolivia. Meanwhile, Hadad et al. (2011) studied how market discipline responds to the introduction of explicit deposit insurance in 104 conventional banks in Indonesia.

Among these studies examining bank level data, none had investigated the impact of deposit insurance on Islamic banks.[3] More than 30 years ago, Malaysia was among the pioneers to develop an Islamic banking system with compatible Islamic principles that operate alongside the conventional system. The deposit insurance system in Malaysia

[2] Deposit insurance system has four distinct design features; (i) the funding type, (ii) sources of funds, (iii) insurance premiums systems and (iv) the coverage limits and coinsurance (see for example Schooner & Taylor, 2010; Demirguc-Kunt, Kane, & Laeven, 2008; LaBrosse & Mayes, 2007; Demirguc-Kunt & Detragiache,2002; Demirguc-Kunt & Sobaci, 2001).

[3] Indonesia also operates a dual banking system. However the study by Hadad et. al (2011) excludes Islamic banks.

covers both the conventional and Islamic banks with the deposit insurance fund being administered separately. Given this unique feature in Malaysia, a study using Malaysia as a country-specific sample for developing countries could not only provide in-depth analysis as opposed to the broad comparative cross-country studies but also compare and contrast the impact of deposit insurance on the conventional as well as Islamic banks. This unique difference for Malaysia appears to justify the expected different findings in the Malaysian context and adds to the Islamic banking body of literature.

(e) There are only two published papers on deposit insurance using Malaysia as a country-specific sample for developing countries. Hence, a study on the impact of deposit insurance system in the Malaysian context, that includes both conventional and Islamic banks remains substantially under researched. The two published papers are descriptive (Devinaga Rasiah & Peong, 2011) and empirical studies (Tuan, Ying, & Nya, 2010).

The empirical study by Tuan, Ying, and Nya (2010) demonstrates deterioration in interest rate risk and risk weighted capital ratio post deposit insurance system. Their findings suggest that there is no significant excessive risk taking by the banks after the introduction of the deposit insurance system in the form of credit risk and liquidity risk. Notwithstanding this, their study has several shortcomings that have to be addressed by future research. Firstly, future studies should cover a longer period than the time frame of 2004-2007. Secondly, to increase the robustness of the study, the sample frame should include all banks protected under the deposit insurance system that includes the foreign and Islamic banks as well as the local conventional banks. Lastly, employing a multivariate regression test other than the Wilcoxon signed-rank test and binomial test such as the panel data methodology would draw more conclusive and generalized results.

(f) Banks are exposed to new and unknown risk, including their exposure to traditional risks such as fraud, because of technological advancement especially with the growth of e-banking and internet banking. While the growth in outsourcing has mitigated some risk it might have aggravated other risks i.e. operational risk. Many research have focused on investigating the effects of deposit insurance on bank risk. These studies have found significant positive evidence on the relationship between bank risks in particular, financial risks with deposit insurance. However, so far only one tier-one empirical study (Chernykh & Cole, 2011) has investigated the relationship for operational risks on deposit insurance. In their study, changes in operational risk is measured by the ratio of bank loans to assets. However, their study finds limited evidence that operational risk increased after the implementation of an explicit deposit insurance system.

Based on the gaps identified above, the objectives of this thesis are threefold:

1. To investigate whether moral hazard problem, in the form of an increase in the bank risk associated with deposit insurance policy, exists in the Malaysian banking system.

2. To compare the risk taking behavior of conventional and Islamic banks after the introduction of the deposit insurance system.

3. To investigate whether risk-based deposit insurance premium explains the cross sectional variation in bank risk in the post-deposit insurance policy period.

1.2 Motivation for this Thesis

"Crucial to the growth of the financial system are institutions that perform a supplementary role to ensure efficient and effective intermediation. The Malaysia Deposit Insurance Corporation (PIDM)… will continue to be key elements in safeguarding financial stability…" (Bank Negara Malaysia, 2011, p.51). The deposit insurance system as a financial safety net is not a particularly apt metaphor. In the circus, a safety net catches those who are falling from a height. However, in banking, financial safety net is meant both to encourage prudent risk taking for banks and to provide assistance (Kane, 2000) to depositors of insolvent banks who have miscalculated the risk involved. In addition, safety nets prevent disintermediation from the banking system and bank failures (Calomiris C. W., 1999).

Prior to the 1997/1998 Asian financial crisis, explicit deposit insurance was already implemented in some of the developing countries including the Philippines (1963), Taiwan (1985) and Korea (1996). Other countries like Malaysia, Indonesia and Thailand relied on implicit protection where troubled institutions are rescued by the government, so depositors are fully protected. Following a number of years after the crisis, an explicit deposit insurance system was developed and implemented in Indonesia (2005), Malaysia (2005) and Thailand (2007). All the deposit insurance systems in these countries specify clearly their legislative objectives, the most common being to protect depositors and contribute to financial stability. Amongst these developing countries, only Malaysia included public policy objectives, namely deposit insurance as a tool for promoting sound risk management practices among the banks and minimizing costs to the financial system.

Malaysia leads in promoting the Islamic finance industry. During the crisis, Islamic banking grew in importance as an alternative to conventional banking that appeared riskier than the Islamic banks (Abduh, Omar, & Duasa, 2011). The aftermath of the global financial crises 2007/2008 showed that, both the conventional and the Islamic banks were affected. For instance, in the United States, many financial institutions suffered soberly. Amongst these institutions are the Royal Bank of Scotland, Bear Stearns, AIG and Lehman Brothers. These institutions were either assisted by the government through mergers or faced failures and are no longer in existence. Big banks such as Morgan Stanley, HSBC and Goldman Sachs also reported serious losses. In April 2009, the International Monetary Fund reported that the governments in the US, UK and European Union had spent almost $9 trillion to support the financial institutions (Wilmarth, 2010).

Meanwhile, the Islamic banks were credited for resilient performance due to the intrinsic strength of Islamic banking.[4] Among the intrinsic values attributed to this resilience are the restrictions on the use of leverage and speculation, less exposure to toxic assets like collateralized debt obligations and mortgage backed securities, avoidance of exotic derivative products and *Shariah* principles of using capital to build productive capacity. In effect, Islamic religious values acts as its own incentive mechanism to reduce the inefficiency that arises from asymmetric information and moral hazard. These intrinsic values of Islamic financing are akin to ethical financing.

The deposit insurance system in Malaysia protects deposits placed with both the conventional and Islamic banks. Thus, investigating the risk-taking behavior of banks post

[4] Islamic Finance and Global Financial Stability Report (Islamic Financial Services Board, 2010). This report was initiated by the Task Force on Islamic Finance and Global Financial Stability formed on 29 October 2008. The Task Force was formed in response to the recommendation made in the Forum of the Global Financial Crisis and its Impact on the Islamic Financial Industry organized by the Islamic Development Bank. The report outlined the financial crisis and financial reforms agenda for the Islamic banking industry.

the introduction of deposit insurance would explain if the public policy objective to promote sound risk management practices has been achieved. More importantly, this thesis examines whether banks increase risk after the introduction of deposit insurance and compares the risk behavior between the conventional and Islamic banks.

On the other hand, deposit insurance is distortionary as it could exacerbate the moral hazard problem. In Malaysia, an important reform on the deposit insurance premium has taken place. The premium calculation migrated from the flat rate premium of 0.06% (for 2006 and 2007) to the differential risk-based premium from 2008 onwards. In the literature (see Bank for International Settlements & International Association of Deposit Insurers, 2009; International Association of Deposit Insurers, 2008), credible design features of a deposit insurance system are tools to mitigate the problem of moral hazard. Thus, it is timely to assess how reforms in the deposit insurance design features discussed above have in fact reduced banks' risk taking in a dual banking system, like in Malaysia. A credible deposit insurance premium constitutes a mechanism that prevents excessive bank risk taking and thereafter promotes sound risk management practices among the banks.

1.3 Deposit Insurance as Part of Financial Safety Net

According to the Financial Stability Forum (2001), financial safety nets consist of three elements that is a deposit insurance system, the lender of last resort and prudential supervisory and regulatory framework. This is the most widely accepted definition. However, some authors defined federal safety nets to include explicit or implicit government guarantees on deposit taking institutions (Walter and Weinberg, 2002). In their definition, guarantee implies the government's role to protect depositors from losses of

insolvent financial institutions. On the other hand, Schich (2008) provided the extended definition of financial safety nets. He incorporated the failure resolution as an additional element of the financial safety nets, in addition to the three elements proposed by the Financial Stability Forum (2001).

Generally, financial safety nets are the financial regulations that are put in place to prevent or limit depositor losses and preserve depositor confidence in the event of a banking failure. More specifically, safety nets include implicit and explicit deposit insurance framework, a lender of last resort function, prudential regulation and supervision in addition to failure resolution. Market discipline imposed by depositors could also complement the safety nets introduced.

Government insurance and other assistance protect the financial system in many countries. Based on the definitions above, the scope of financial safety nets that take into account deposit insurance system is immense. Proponents of deposit insurance include the policy makers. They argue that the deposit insurance system is fundamental to promoting financial stability in the banking system and, maintaining confidence of depositors whose deposits are extended as loans and for business expansion by firms who rely on banks for credit. The disruption in banks' role to manage this flow of payments and a source of credit to businesses could potentially create social cost outside the banking system (Gropp, Hakenes, & Schnabel, 2011). Hence, it is vital to insulate banks, depositors and debtors from adverse shocks, particularly from systemic bank runs. Bank runs occur when depositors who have lost confidence in a bank simultaneously withdraw their deposits to force the bank to close due to liquidity problems.

This leads one to argue why banks are eligible to receive special treatment in the form of government safety net, in contrast to other profiteering firms. An understandable explanation relates to the spillover effects or contagion effect for other sectors if a bank fails. Contagion is a process by which a run on one bank spreads to other banks resulting in a bank panic. Whereas bank panic is a situation when many banks simultaneously experience a run. In the event of bank runs, the banks might be driven to insolvency as depositors withdraw money, all at the same time forcing them to sell illiquid assets at discounted prices ("fire sale") to meet this liquidity demand. A common way to prevent this dire situation is intervention by the central bank either serving as a lender of last resort directly to the solvent banks or indirectly through open market operations to provide liquidity. If a credible deposit insurance system is in place whereby depositors have confidence in the banking system, a run could be avoided and the lender of last resort facility would not have to be called upon.

1.3.1 The Development of Deposit Insurance

The safety net protects households and businesses from contagious shocks. In the case of Malaysia, a comprehensive financial safety net that encompasses on going prudential regulations and supervision by the BNM, the lender-of-last-resort facility provided by the BNM and a deposit insurance framework by the Perbadanan Insurance Deposit Malaysia (also known internationally as Malaysia Deposit Insurance Corporation; MDIC) have all been put in place.

The risk of severe financial crisis could be mitigated by having an appropriate financial safety net. Without one in place, rumors spread on the state of health of a banking

institution could become contagious and turn the whole economy into a financial crisis. Hence, a well-designed financial safety net could preserve and boost the depositors' confidence in the banking system, which could prevent bank runs and eventually full-blown financial crises.

Deposit insurance was first adopted in the United States in the 1930s. Deposit insurance is a form of guarantee which covers all or a portion of the deposits in a bank by the deposit insurer which could be the Central Bank, a subsidiary of the Central Bank or could also be separate like the Federal Deposit Insurance Corporation (FDIC). Hereafter, the deposit insurer would also be interchangeably referred to as government. The introduction of deposit insurance as a form of financial safety net is aimed at providing stability for the banking system and protecting the depositors' interest as well as increasing savings and encouraging the development of the banking system. Furthermore, it could provide confidence to depositors that their money or deposit is safe with the bank and arguably the deposit insurance provides a mechanism to these depositors to be able to quickly recover their funds that they have deposited in an insolvent bank.

The Report of the Financial Stability Forum on Enhancing Market and Institutional Resilience (April 2008) recommended that deposit insurance be incorporated as part of the robust mechanism that dwells with financial institutions in distress. It further pointed out that the various fragilities that transpired during the financial crisis of this decade illustrate the vital need for the introduction of an effective deposit insurance system. Elsewhere, the Basel Committee's Core Principles for Effective Banking Supervision (October, 2006) acknowledged that an effective deposit insurance system could restore public confidence in the banking system while at the same time limit the contagion effects from banks in distress.

Likewise, to mitigate principal-agent problems due to moral hazard that could distort the banks financial intermediation function, the deposit insurance system has to be designed in a credible manner (see Bank for International Settlements & International Association of Deposit Insurers, 2009; International Association of Deposit Insurers, 2008) and exists alongside the existing prudential regulations and supervision.

1.3.2 Deposit Insurance around the World

Although deposit insurance was formally introduced in US in the 1900s, the history of deposit insurance system could be traced back to the early 1800s. The insurance system then was known as the New York's Safety Fund that covered only the State of New York. The objective of this insurance scheme is to protect deposits and to circulate notes in the event of a bank failure. However, the scheme failed and became insolvent in 1842, as being private in nature, the scheme fails to fulfill its obligations. Subsequently, eight new insurance schemes were introduced in the early 1920s. However, these schemes too were unsuccessful mainly due to limited funding and insufficient monitoring (Calomiris C. W., 1990).

In 1933, the first federal government sponsored deposit insurance system in the world known as the Federal Deposit Insurance Corporation (FDIC), was introduced in the United States of America to resolve a bank run that was leading towards a banking crisis at that time. In contrast to the previous schemes, the FDIC was funded through capital provided by the Treasury and the Federal Reserve Banks. The FDIC limited guarantee scheme still exists with modifications to restore depositors' confidence and financial system stability.

In Europe, Norway was amongst the earliest countries to adopt deposit insurance for its savings institutions in 1921 and this was later extended in 1938 to conventional banks. Meanwhile, in the Western European countries, deposit insurance started between the late 1970s and the early 1980s. The failure of banks in Western Europe such as the Bankhaus Herstatt in Germany in 1974, resulted in the adoption of the deposit insurance system in some European countries like Belgium, Austria and France in 1974, 1979 and 1980 respectively. Further, in 1994, most European countries have an explicit deposit insurance system in place to comply with the European Union's Directive on Deposit Insurance.

In the United Kingdom, formal deposit insurance was first introduced in 1986 to protect depositors and members of the Building Societies Association. The introduction of the Financial Services Compensation Scheme in 2000 extended the deposit protection to all financial institutions, including insurance companies. Elsewhere, in Canada, deposit insurance was introduced in 1967 and administered by the Canada Deposit Insurance Corporation.

India was the first country in Asia to adopt a deposit insurance system in 1961, followed by the Philippine in 1963. Other countries in Asia like Malaysia and Indonesia, introduced a formal deposit insurance system in 2005 in response to the Asian financial crisis in 1998/1999. In 1998, the deposit insurance system was recognized by the International Monetary Fund as a 'best-international practice'. The financial crisis in 2007/2008 brought renewed attention to the concept and practice of deposit insurance by regulators around the world. Many countries that were yet to adopt or delayed in adopting a deposit insurance system, were driven to do so in the wake of the crisis. Australia, for instance, was among the last few countries to implement the explicit deposit insurance system, which is in

October 2008. By the time of the Demirguc-Kunt, Kane, and Laeven (2008) study, 180 countries had adopted some form of deposit insurance system.

From only 12 countries implementing explicit deposit insurance since 1974, the numbers have steadily increased to 111 countries (see Table 1.1) as at December 2012.[5] Elsewhere, 41 countries (see Table 1.2) are constructing or studying the implementation of an explicit deposit insurance system. For countries that do not implement an explicit deposit insurance system, there exists an implicit deposit insurance system with discretionary government guarantee or protection for the depositors.

To share knowledge and expertise among the deposit insurers around the world, the International Association Deposit Insurance (IADI) was founded on 6 May 2002. IADI originated in 2000 as the Working Group on Deposit Insurance established by the Financial Stability Forum (FSF). On 18 June 2009, the Basel Committee on Banking Supervision and the International Association of Deposit Insurers jointly issued a voluntary framework for effective deposit insurance practices known as the *Core Principles for Effective Deposit Insurance System*.

[5] The information obtained in IADI website is only updated as at 31 March 2011.

Table 1.1: List of Countries Implementing an Explicit Deposit Insurance System

1. Afghanistan	38. Gibraltar	75. Nicaragua
2. Albania	39. Greece	76. Nigeria
3. Algeria	40. Guatemala	77. Northern Mariana Island
4. Argentina	41. Honduras	78. Norway
5. Armenia	42. Hong Kong	79. Oman
6. Australia	43. Hungary	80. Paraguay
7. Austria	44. Iceland	81. Peru
8. Azerbaijan	45. India	82. Philippines
9. Bahamas	46. Indonesia	83. Poland
10. Bahrain	47. Ireland	84. Portugal
11. Bailiwick of Jersey	48. Isle of Man	85. Puerto Rico
12. Bailiwick of Guernsey	49. Italy	86. Romania
13. Bangladesh	50. Jamaica	87. Russian Federation
14. Barbados	51. Japan	88. Serbia
15. Belarus	52. Jordan	89. Singapore
16. Belgium	53. Kazakhstan	90. Slovakia
17. Bermuda	54. Kenya	91. Slovenia
18. Bosnia and Herzegovina	55. Korea	92. Spain
19. Brazil	56. Kyrgyz Republic	93. Sri Lanka
20. British Virgin Islands	57. Lao PDR	94. Sudan
21. Brunei	58. Latvia	95. Sweden
22. Bulgaria	59. Lebanon	96. Switzerland
23. Canada (and Quebec)	60. Libya	97. Tajikistan
24. Chile	61. Liechtenstein	98. Tanzania
25. Chinese Taipei	62. Lithuania	99. Thailand
26. Colombia	63. Luxembourg	100. Trinidad and Tobago
27. Croatia	64. Macedonia	101. Turkey
28. Cyprus	65. Malaysia	102. Uganda
29. Czech Republic	66. Malta	103. Ukraine
30. Denmark	67. Mexico	104. United Kingdom
31. Dominican Republic	68. Micronesia	105. United States
32. Ecuador	69. Moldova	106. Uruguay
33. El Salvador	70. Montenegro	107. Uzbekistan
34. Estonia	71. Morocco	108. Venezuela
35. Finland	72. Netherlands	109. Vietnam
36. France	73. Nepal	110. Yemen
37. Germany	74. New Zealand	111. Zimbabwe

Source: International Association of Deposit Insurers website as at December 2012

Table 1.2: List of Countries Constructing or Studying an Explicit Deposit Insurance System

Deposit Insurance System Under Construction		
1. Costa Rica	4. Mozambique	7. Turks and Caicos Island
2. Kosovo	5. Palestine	8. Zambia
3. Mauritius	6. Syria	
Deposit Insurance System Under Study		
1. Angola	12.Gabon	23. Mongolia
2. Bhutan	13. Gambia	24. Namibia
3. Cambodia	14. Georgia	25. Pakistan
4. Cameroon	15. Ghana	26. Qatar
5. Central African Republic	16. Grenada	27. Rwanda
6. Chad	17. Iran	28. Senegal
7. China	18. Israel	29. Seychelles
8. Congo	19. Lesotho	30. South Africa
9. Curacao and Sint Maarten	20. Liberia	31. Swaziland
10. Equational Guinea	21. Macao	32. Tunisia
11. Ethiopia	22. Malawi	33. United Arab Emirates

Source: International Association of Deposit Insurers website as at December 2012

1.3.3 Deposit Insurance in Malaysia

In Malaysia, deposit insurance system was initially proposed in 2001 as part of the Financial Sector Master Plan. The Malaysian deposit insurance system is mandated by law and administered by Perbadanan Insurans Deposit Malaysia (PIDM), a statutory body established in 2005. PIDM is also known internationally as the Malaysia Deposit Insurer Corporation (MDIC). MDIC complements BNM's (which is the primary regulator and supervisor of the banking system) role[6] by providing safety nets for depositors and insurance policy holders (member bank) in promoting financial stability. MDIC was established under the MDIC Act on 1 September 2005 to administer the national explicit deposit insurance system.

[6] MDIC role includes bank resolution function.

The government of Malaysia implemented the explicit deposit insurance system on 1 September 2005. Hence, Malaysia migrated from a system with ambiguous implicit deposit insurance system to an explicit deposit insurance system with partial deposit insurance coverage. The deposit insurance protection limit was then RM60,000 (principal and interest or return) per depositor per member bank. The deposit insurance system covers both the conventional and Islamic banks. The membership for the deposit insurance is compulsory for all conventional banks licensed under the Banking and Financial Institutions Act and all Islamic banks licensed under the Islamic Banking Act, including foreign banks operating in Malaysia (see Table 1.3). Membership is compulsory as provided under the PIDM Act. However, the five deposits-taking institutions [*Bank Simpanan Nasional (BSN), Bank Kerjasama Rakyat Malaysia Bhd (Bank Rakyat), Bank Pertanian Malaysia Bhd (AgroBank), Bank Pembangunan Malaysia Bhd (BPMB) and Bank Perusahaan Kecil dan Sederhana Malaysia Bhd (SME Bank)*], investment banks, overseas branches of domestic banking institutions and all-non-bank financial intermediaries which are not supervised or regulated by BNM are not member institutions of MDIC. Therefore, deposits placed in these banks or institutions are not protected under the deposit insurance system administered by MDIC.

Moving on, a Government Deposit Guarantee (GDG) which is a form of blanket guarantee was announced on 16 October 2008, to provide additional depositor protection over and above the RM60,000 per depositor per member bank that was already provided by MDIC. Consistent with measures taken by neighboring countries, the GDG was implemented as a temporary pre-emptive and precautionary measure to preserve confidence in the banking system and maintain financial stability. Under the GDG, all *Ringgit* and foreign currency deposits placed in conventional banks, Islamic banks, investment banks and international

Islamic banks are protected. In addition, the five deposits-taking institutions licensed under the Development Financial Institution Act are also included in this GDG blanket guarantee. The Government provided the GDC until 31 December 2010. Thereafter, the deposit insurance protection limit was increased from RM60,000 to RM250,000 per depositor per member bank. As for funding of the deposit insurance, a fixed rate premium assessment was paid by member institutions from September 2005 until December 2007. From 2008 onwards, payments were based on the risk-based differential premium systems.

The membership is now compulsory only for all conventional banks licensed under the Banking and Financial Institutions Act and all Islamic banks licensed under the Islamic Banking Act, including foreign banks operating in Malaysia. The Malaysian deposit insurance system covers Islamic and conventional deposits separately. It is funded by annual premiums collected from the member institutions in respect of Islamic and conventional deposits, with the funds separately administered. The Islamic Deposit Insurance Fund is administered in accordance with *Shariah* principles. Following the expiry of GDG, deposits placed in the five deposit taking development financial institutions are no longer protected by MDIC. In addition, under the MDIC (Provision of Information on Deposit Insurance) Regulations 2011, all member banks are required to display their membership sign at the entrances to all branches. The following sections discussed the banking system in Malaysia.

Table 1.3: List of PIDM Member Banks

Conventional Banks		
Domestic	**Foreign**	
1. Affin Bank Berhd	1. Bangkok Bank Berhad	11. Mizuho Corporate Bank (Malaysia) Berhad
2. Alliance Bank Berhad	2. Bank of America Malaysia Berhad	12.OCBC Bank (Malaysia) Berhad
3. AmBank (M) Berhad	3. Bank of China (Malaysia) Berhad	13.Standard Chartered Bank Malaysia Berhad
4. CIMB Bank Berhad	4. Bank of Tokyo Mitsubishi-UFJ (Malaysia) Berhad	14.Sumitomo Mitsui Banking Corporation Malaysia Berhad
5. Hong Leong Bank Berhad	5. BNP Paribas Malaysia Berhad	India International Bank M'sia Bhd
6. Malayan Banking Berhad	6. Citibank Berhad	15.The Bank of Nova Scotia Berhad
7. Public Bank Berhad	7. Deutsche Bank (Malaysia) Berhad	16.The Royal Bank of Scotland Berhad
8. RHB Bank Berhad	8. HSBC Bank Malaysia Berhad	17.United Overseas Bank (Malaysia) Berhad
	9. Industrial and Conventional Bank of China (Malaysia) Berhad	18.National Bank of Abu Dhabi Msia Bhd
	10.J.P. Morgan Chase Bank Berhad	

Islamic Banks		
Domestic		**Foreign**
1.Affin Islamic Bank Berhad	7. Hong Leong Islamic Bank Berhad	1.Al Rajhi Banking & Investment Corporation (Malaysia) Bhd
2.Alliance Islamic Bank Berhad	8. Maybank Islamic Berhad	2.Asian Finance Bank Berhad
3. AmIslamic Bank Bhd	9. Public Islamic Bank Berhad	3.HSBC Amanah Malaysia Berhad
4. Bank Islam Malaysia Berhad	10. RHB Islamic Bank Berhad	4.Kuwait Finance House (M) Berhad
5.Bank Muamalat Malaysia Berhad		5.OCBC Al-Amin Bank Berhad
6. CIMB Islamic Bank Berhad		6.Standard Chartered Saadiq Berhad

Source: MDIC website as at 7 January 2013

1.4 Banking System in Malaysia

The Malaysian financial structure consists of the banking system and non-bank financial institutions. The banking system mainly consists of Bank Negara Malaysia and banking institutions such as the conventional banks, investment banks, Islamic banks and international Islamic banks (refer Table 1.4 and Table 1.5). The largest component of the financial structure is the banking system. Bank Negara Malaysia was established on 26 January 1959, under the Central Bank of Malaya Ordinance 1958 (Revised 1994) to oversee the operation of financial sectors, promote economic growth and maintain monetary and financial stability. The BNM's functions also include regulating and supervising the insurance industry, money changers and the development financial institutions. BNM was also appointed as the Competent Authority under the Anti-Money Laundering Act 2001 (AMLA). In addition, the Governor of BNM is also the Controller of Foreign Exchange.

Table 1.4: List of Banking Institutions in Malaysia – Commercial and Islamic Banks as at end of December 2012

Commercial banks	Islamic banks
1. Affin Bank Bhd (L)	1. Affin Islamic Bank Berhad (L)
2. Alliance Bank (M) Bhd (L)	2. Al Rajhi Banking & Investment Corporation (Malaysia) Berhad (F)
3. AmBank (M) Bhd (L)	3. Alliance Islamic Bank Berhad (L)
4. BNP Paribas Malaysia Berhad (F)	4. AmIslamic Bank Berhad (L)
5. Bangkok Bank Berhad (F)	5. Asian Finance Bank Berhad (F)
6. Bank of America Malaysia Berhad (F)	6. Bank Islam Malaysia Berhad (L)
7. Bank of China (Malaysia) Berhad(F)	7. Bank Muamalat Malaysia Berhad (L)
8. Bank of Tokyo-Mitsubishi UFJ (Malaysia) Berhad (F)	8. CIMB Islamic Bank Berhad (L)
9. CIMB Bank Berhad (L)	9. HSBC Amanah Malaysia Berhad (F)
10. Citibank Berhad (F)	10. Hong Leong Islamic Bank Berhad (L)
11. Deutsche Bank (Malaysia) Berhad (F)	11. Kuwait Finance House (Malaysia) Berhad (F)
12. HSBC Bank Malaysia Berhad (F)	12. Maybank Islamic Berhad (L)
13. Hong Leong Bank Berhad (L)	13. OCBC Al-Amin Bank Berhad (F)
14. India International Bank (Malaysia) Berhad (F)	14. Public Islamic Bank Berhad (L)
15. Industrial and Commercial Bank of China (Malaysia) Berhad (F)	15. RHB Islamic Bank Berhad (L)
16. J.P. Morgan Chase Bank Berhad (F)	16. Standard Chartered Saadiq Berhad (F)
17. Malayan Banking Berhad (L)	
18. Mizuho Corporate Bank (Malaysia) Berhad (F)	
19. National Bank of Abu Dhabi Malaysia Berhad (F)	
20. OCBC Bank (Malaysia) Berhad (F)	
21. Public Bank Berhad (L)	
22. RHB Bank Berhad (L)	
23. Standard Chartered Bank Malaysia Berhad (F)	
24. Sumitomo Mitsui Banking Corporation Malaysia Berhad (F)	
25. The Bank of Nova Scotia Berhad (F)	
26. The Royal Bank of Scotland Berhad (F)	
27. United Overseas Bank (Malaysia) Bhd (F)	

Source: Bank Negara Malaysia website

Note: L (local) or F (foreign) indicates ownership of the banking institutions.

Table 1.5: List of Banking Institutions in Malaysia – Investment and International Islamic Banks as at end of December 2012

Investment Banks	International Islamic Banks
1. Affin Investment Bank Berhad	1. Alkhair International Islamic Bank Bhd
2. Alliance Investment Bank Berhad	2. Deutsche Bank Aktiengesellschaft
3. AmInvestment Bank Berhad	3. Elaf Bank B.S.C. (c)
4. CIMB Investment Bank Berhad	4. PT. Bank Syariah Muamalat Indonesia, Tbk
5. ECM Libra Investment Bank Berhad	
6. Hong Leong Investment Bank	
7. HwangDBS Investment Bank Berhad	
8. KAF Investment Bank Berhad	
9. Kenanga Investment Bank Berhad	
10. MIDF Amanah Investment Bank Berhad	
11. MIMB Investment Bank Berhad	
12. Maybank Investment Bank Berhad	
13. OSK Investment Bank Berhad	
14. Public Investment Bank Berhad	
15. RHB Investment Bank Berhad	

Source: Bank Negara Malaysia website
Note: All the investment banks are locally owned.

Conventional banks were the earliest financial institution established in Malaysia. During the British colonial days, foreign banks began to set-up branches in Malaysia especially near the harbor of Penang, Malacca and Singapore. At that time, these conventional banks were owned by foreign entities especially by the British. In 1859, the first conventional bank known as the Chartered Mercantile Bank of India, London and China was founded in Penang. The Chartered Bank and the Hongkong & Shanghai Bank were established in Penang in 1875 and 1877, respectively and are still operating in Malaysia. The conventional banks, as a group in Malaysia, form the largest and most significant financial institutions in the country. As at end of August 2011[7], the conventional banks are the largest component of the banking system. The conventional banks account for 80% of the total assets in the banking system followed by the Islamic banks and investment banks at 17% and 3% respectively.

As at 31 August 2011, the deposits in the conventional banking system comprise 81% of the total banking system deposits of RM1.21 billion. The majority of the deposit holders were individual depositors (36.46%), followed by business enterprises (36.02%), financial institutions (16.56%) and others (federal/state government, statutory authorities etc.). Meanwhile, RM229.6 million deposits are in the Islamic banking system (excluding Islamic banking scheme). As of December 2012, there are nine domestic and seventeen locally incorporated foreign banks operating through a network of about 2,325 branches across the country. In addition, there are 6 development financial institutions (DFIs) that operate alongside their conventional and Islamic banks counterparts. The conventional banks and Islamic banks are licensed under the Banking and Financial Institutions Act (BAFIA) 1989 and Islamic Banking Act 1983 respectively while the DFIs are licensed

[7]Bank Negara Malaysia Monthly Statistical Bulletin, August,2011

under the Development Financial Institution Act (DFIA) 2002, that are supervised by the central bank of Malaysia. BNM is responsible for maintaining monetary stability and ensuring a sound financial system. BNM acts as a banker as well as an economic and financial adviser to the government. Moreover, BNM acts as lender of last resort to the banking system, responsible for issuing the Malaysian currency (the *Ringgit*) and administers the country's foreign exchange control regulations.

Malaysia embarked on a pioneering effort to develop a comprehensive Islamic financial system more than 30 years ago. It was among the earliest country to recognize the potential of creating a financial system compatible with Islamic principles that provides an alternative to the conventional system. The process began with the first Islamic financial institution, Lembaga Tabung Haji (The Pilgrim Fund Board) which was established in 1969. Subsequently, the Islamic Banking Act 1983 was introduced and Bank Islam Malaysia Berhad, the first full-fledged Islamic bank commenced operations on 1 July 1983. On 1 October 1999, a second Islamic bank, Bank Muamalat Malaysia Berhad was set up. The banking activities of Islamic banks are based on the Islamic principles namely *Shariah* principles. In terms of products, all Islamic banking entities offer banking products based on *Shariah* principles.

Investment banks emerged in the Malaysian banking scene in the 1970s. All the merchant banks and discount houses were transformed into investment banks from July 2005. Investment banks play a role in the short term money market and capital raising activities including financing, specializing in syndication, corporate finance and management advisory services, issuing and listing of shares arrangement as well as investment portfolio management. As at December 2012, there are 15 investment banks in Malaysia.

On the other hand, the non-bank financial institutions provide financial services that are not provided by the banking system. Amongst the major players of the non-bank financial institutions are the insurance companies, *takaful* operators, savings institutions, unit trusts providers and other institutions like Bursa Malaysia; the stock exchange of Malaysia. The insurance companies are engaged in providing insurance service; with the *takaful* extending alternative services that are based on *Shariah* principle. The general insurance companies operate on commercial terms. Bank Simpanan Nasional and cooperative societies are the main savings institutions in Malaysia. These savings institutions operate in mainly the rural areas that are not adequately served by the banks to promote savings among the low and middle income Malaysians.

1.4.1 The Asian 1997-1998 and 2007/2008 Global Financial Crisis

In the last decade, the Asian financial crisis that commenced with the collapse of the Thai Baht on 2 July 1997, led to a serious financial meltdown in Malaysia. The crisis led Malaysia to initiate its financial sector reforms. The depreciation of *Ringgit* and the decline of the stock market affected many Malaysian investors and companies especially those highly geared Malaysian multinational companies. The depreciation of the *Ringgit* forced these companies to default in servicing their loans that eventually created a liquidity pressure on the banks. As a result, Malaysia's economic growth rate contracted to -7.3% in 1998[8] from 7.32% in 1997. To maintain confidence in the economy, the Government announced in 1998, an implicit guarantee to cover deposits in the Malaysian banking institutions.

[8]Department of Statistic Malaysia website.

Essentially, the financial system in Malaysia remains sound despite the 1997 Asian financial turmoil. Hence, it is interesting to take Malaysia as a case study. Based on Malaysia's experience, the financial sector plays a crucial role in leading economic growth. During the Eighth Malaysian Plan[9] period, the financial sector contributed 3.4% to the GDP. The Ninth Malaysian Plan[10] reported that the financial sector grew 8.1% during the period 2001 to 2005. The share of the financial sector to economic growth increased from 12.7% in 2000 to 15.1% in 2005. Prior to the 1997/1998 crisis, the Malaysian economy was flourishing with a strong broad-based economic growth amidst low and stable inflation, with GDP growth averaging 8% for eight consecutive years. The banking sector was also at its strongest position during the ensuing periods of regulatory enhancements. Malaysia rebounded from the crisis from 1999 to 2002 following a series of policies including the pegging of the *Ringgit* to the US dollar in 1998, mergers and acquisitions of the banking sector and selective capital controls.

The Malaysian conventional banking industry grew tremendously in terms of assets (loans), deposits and equity. All three indicators show a positive growth trend. Total assets increased 138.06% during the period 2001 to 2007, while total deposits and total equity rose about 136% and 49% respectively. Comparing these three indicators, the growth in equity lagged far behind growth in total asset and deposits. It is a signal that most banks rely on debt rather than equity financing. In this regard, bank-based rather than a market-based financial system predominates in Malaysia as firms rely more on finance provided by banks rather than on the financial markets. The 2007/2008 global financial crisis threatened a worldwide economic recession. The credit crunch is known as having brought panic and turmoil to the world financial markets. From a subprime crisis, it quickly grew into a

[9] http://www.epu.gov.my/eighthmalaysiaplan.
[10] http://www.epu.gov.my/ninthmalaysiaplan.

banking crisis with the investment and merchant banks first absorbing the impact before it spread to the conventional banks (Krugman P. , 2009). However, Malaysia successfully survived the crisis and continues to remain resilient than the other countries in the region.

1.4.2 The Financial Sector Master Plan (2001-2010)

In March 2001, BNM launched the Financial Sector Master Plan (FSMP). FSMP amongst others outlined the strategies to develop a resilient, diversified and efficient financial sector. Furthermore, the ten year blueprint's objective was to strengthen the financial sector that included the introduction of an explicit deposit insurance framework. Its aim was "to develop a more resilient, competitive and dynamic financial system with best practices, that support and contribute positively to the growth of the economy throughout the economic cycle and has a core of strong and forward looking domestic financial institutions that are more technology driven and ready to face the challenges of liberalization and globalization" (p.16).

The FSMP plan covered the period of 2001 to 2010. The FSMP outlined the consolidation exercise in three phases. Phase 1 was targeted at strengthening the banking sector through consolidation among local banks and finance companies. The BAFIA was accordingly amended to grant dual banking licenses to conventional banks that merged with finance companies to allow them to continue operating banking business as well as offer the services of finance companies. Phase II continued with leveling the playing field for the banking industry with the removal of some barriers for foreign banks while Phase III witnessed further liberalization where licenses were granted to new foreign banks and also to domestic banks which venture into foreign markets.

An important aspect of the FSMP that has relevance to this study is the recommendation to establish an explicit deposit insurance system to strengthen the existing depositor protection infrastructure to ensure financial stability. This is explicitly discussed under Section III in Chapter Three of the FSMP.

1.4.3 The Financial Sector Blueprint (2011-2020)

Bank Negara Malaysia released the Financial Sector Blueprint (FSB) on 21 December 2011 that would again act as a catalyst for the domestic banking industry which is already on a sound footing. The Financial Sector Master Plan 2001–2010 had been a success considering that the banking sectors are now well positioned to embrace new imperatives ahead. The mergers of commercial banks and finance companies were completed leaving only ten banking groups, hence improved capitalization. The investment banks were created from the mergers of discount houses, stockbroking companies and the merchant banks for better supervision in maintaining financial soundness. The new entrants of foreign banks, particularly foreign Islamic banks, in the market encourage innovation and efficiency in the banking industry. The deposit insurance system was introduced in September 2005 to improve the existing consumer protection framework. Meanwhile the FSB, which advocates further liberalization, is envisaged to propel the financial sector to unprecedented heights. There are nine focus areas of the FSB as shown in Table 1.6 below:

Table 1.6: Nine Focus Areas of the Financial Sector Blueprint 2011-2020

1	Effective intermediation for a high value-added and high-income economy
2	Developing deep and dynamic financial markets
3	Financial inclusion for greater shared prosperity
4	Strengthening regional and international financial integration
5	Internationalization of Islamic finance
6	Regulatory and supervisory regime to safeguard the stability of the financial system
7	Electronic payments for greater economic efficiency
8	Empowering consumers
9	Talent development to support a more dynamic financial sector

Among the nine focus areas listed in Table 1.6, one area of concern for this study specifically is the sixth area related to regulatory and supervisory regime to safeguard the stability of the financial system. Given this, the explicit deposit insurance system, as one of the elements of a safety net, plays a crucial role in safeguarding the stability of the Malaysian banking system.

1.5 Problem Statement

Banking institutions function as an efficient payment vehicle. If a single bank fails to perform its basic function, it would cause a contagion effect and systemic risk to other banks, including the healthy banks, inadvertently leading to financial instability. The outcome could be severe as a systemic risk could have adverse impacts on economic growth. The history of banking crises and their results worldwide have shown that banking crisis have resulted in losses to depositors and creditors in many countries including the bankruptcy of Lehman Brothers in the United States and the Northern Rock bank runs in the United Kingdom. During bank runs, unsophisticated depositors have insufficient information regarding banks' asset quality. Hence, they assume that all banks are in distress including the healthy banks.

Therefore, fearing the safety of their deposits, they start withdrawing their money, all at the same time (Mishkin, 2009). This simultaneous withdrawal leads to a decline in funds available for investment and decreases lending activity. As a result, loan supply comes down and the interest rate goes up. With the reduction in loan supply, the banks' profit would decline as well. The chain effect would continue and affect the shrinking economic growth, unless the Government intervenes.

In order to channel funds in the form of loan to the growth sector, banks have to solicit deposits particularly deposits from the household, as the cost of fund of these types of deposit is cheap and less sticky. However, the drawback is that most of the household depositors are unsophisticated depositors who have little information about the banks' state of health. Any news or rumors that could reduce depositor confidence with a bank could lead to a bank run. Thus, proponents of deposit insurance system argue that a guarantee on the deposits increases depositors' confidence and prevents the occurrence of a future bank run, thereby ensuring financial stability.

This testifies that depositors' confidence in the banking system is crucial, as their aggregate savings are the basis for capital formation (Alter, Goldin, & Rotella, 1994). Thus, deposit insurance plays an important role in maintaining this unsophisticated depositors' confidence in the banking system but at the same time providing the incentives for banks to increase their risk taking due to the moral hazard problem. It is worth mentioning that the United States has a deposit insurance system in place for almost 80 years and yet the banking system was affected by instability due to financial crisis. However, one striking fact is that ordinary Americans never lost faith in the security of their bank deposits. Therefore, it does not matter how long a country has adopted a deposit insurance system. What is more important is that the system must be able to maintain depositors' confidence.

The deposit insurance system appears to be like a double-edged sword. On the one hand, a deposit insurance system is a regulatory policy, designed to protect depositors, hence it provides stability. At the same time deposit insurance protection, could also increase banking system fragility due to the moral hazard problem in the form of an increase in bank risk. If banks pay deposit insurance premium to mitigate the moral hazard problem, there will be a welfare cost to depositors, borrowers and other stakeholders. However, if there is no premium, banks might increase their risk, following the introduction of deposit insurance system. A properly priced and risk-sensitive deposit insurance premium would then offset this welfare cost.

Without a formal deposit insurance system, governments particularly in developing countries extend some form of implicit deposit protection to depositors on a discretionary basis that could be more costly than a formal deposit insurance system. The question is not just having an explicit deposit insurance system in place. A credible deposit insurance system is required to protect depositors as well as promote prudent risk management among banks i.e. mitigating the moral hazard problem. Thus, the resolution to maintain stability of the banking system through various measures, including the implementation of an explicit deposit insurance system is pertinent and critical to prevent a worse scenario for the economy, particularly in a developing country (Poole, 2010). The deposit insurance system is a "risk-minimizer" created to maintain depositors' confidence and protect their savings, hence preventing a bank run. A credible deposit insurance system including the insurance premium system that is sensitive towards bank risk would mitigate moral hazard and complement the existing supervisory and regulatory role of the central bank.

1.6 Research Questions and Objectives

The research objectives described in the previous section could be decomposed into detailed research questions that map the road for further investigation in this thesis.

The research questions are as follows:

1. Whether the moral hazard problem by way of increased risk taking by banks is present in the Malaysian banking system after the introduction of the deposit insurance system?

2. Whether there is any significant difference in the risk taking behavior of conventional banks and Islamic banks after the introduction of the deposit insurance system?

3. Whether the deposit insurance premium sensitivity towards bank risk improves in the risk-based premium system in mitigating the moral hazard problem?

The primary objective of this study is to ascertain whether the deposit insurance system promotes sound risk management practices among the conventional banks as well as the Islamic banks under a deposit insurance premium that is sensitive towards bank risk to mitigate the moral hazard problem. The specific research objectives of the study include:

1. To investigate the presence of moral hazard by way of increased bank risk in the Malaysian banking system after the introduction of deposit insurance system.

2. To evaluate and compare the risk taking behavior of conventional and Islamic banks after the introduction of deposit insurance system.

3. To ascertain whether the deposit insurance premium is sensitive towards bank risk in the risk-based premium system (credible) in mitigating the moral hazard problem.

To achieve the overall objectives above, this thesis employs the dynamic panel data model specifically the System Generalized Method of Moment (System GMM). For the first objective, this thesis first runs individually the full sample regression for the Malaysian banks to investigate the relationship between bank risk taking and deposit insurance system. Then in the second objective, the sample is divided into conventional and Islamic banks to compare the differences in bank risks between these two types of banks.

For the third objective, the annual premium paid by banks is estimated with modification based on the Guidelines on Total Insured Deposits, Guidelines on the Differential Premium System and Guidelines for Deposit Insurance Coverage for Deposits issued by the Malaysian Deposit Insurance Corporation. These Guidelines are retrievable at the Malaysian Deposit Insurance Corporation website. The calculation is described in detail under Section 3.2. in Chapter 3. This thesis investigates the sensitivity of the deposit insurance premium with bank risks using both the dummy variable for the insurance premium assessment method and the estimated annual premium amount paid by the banks to ascertain whether the insurance premium system is an effective or credible tool to mitigate the moral hazard problem.

1.7 Contributions of the Thesis

This study contributes from several aspects with regards to knowledge, methodology and policy that is discussed in the following paragraph.

(a) Firstly, despite the fact that there is a large literature that examine the impact of deposit insurance system under the moral hazard framework, there is a scarcity of prior research that empirically examines the impact of a formal deposit insurance system on Islamic banks. The Malaysian Islamic financial sector is the most advanced among the countries that have a dual banking system and ranks higher in terms of Islamic banking assets. In addition, conventional and Islamic deposit insurance coexists in Malaysia though they are administered separately. In fact, some countries are looking at Islamic deposit insurance as a catalyst to sustain and attract Islamic funds in their countries, thus helping them to spur the growth of Islamic finance and the economy (Arshad, 2011).

Therefore, the thesis extends the existing literature by examining the impact of deposit insurance on bank risks for both the conventional banks and Islamic banks. This is the first study that investigates the implication of deposit insurance in a dual banking system particularly on the Islamic banks. Although there is a significant amount of literature on the impact of deposit insurance on conventional banks, due to data limitations, no empirical study has examined the impact of deposit insurance system on the Islamic banks. It might not be appropriate to apply the conclusions from conventional banks to interpret the impact on the Islamic banks, although similar findings could occur.

(b) Secondly, the thesis provides new evidence in a country specific study on how the shift from a flat rate to a risk-based deposit insurance premium policy[11] would not necessarily be effective in mitigating the moral hazard problem when the risk-based premium is inadequate to cover for the increase in bank risk. The literature suggests that the risk-based premium method could mitigate the moral hazard problem (see for example Hovakimian,

[11] There are two distinct premium assessment method namely the flat rate premium and the risk based premium also known as the differential premium system. With the fixed rate insurance premium, all member banks paid comparable insurance premium amount notwithstanding their risk portfolio. On the contrary, differential insurance premium incorporates the risk of each bank assets into the premium structure. Thus, the insurance premiums that each bank pays will depend on its portfolio of risk.

Kane, & Laeven, 2003; Cull, Senbet, & Sorge, 2005; Demirguc-Kunt & Detragiache, 2002; Demirguc-Kunt & Huizinga, 2004). However, none of the country specific empirical studies in the deposit insurance literature (see Chernykh & Cole, 2011; Hadad et al., 2011; Ioannidou & Penas, 2010) has thus far examined the effect of bank risk taking and deposit insurance under different premium methods as these countries (Russia, Indonesia and Bolivia) continue to adopt the flat rate insurance premium until today. On the contrary, this study suggests that although Malaysia migrated from the flat rate premium to the risk based premium in the year 2008, the current risk-based premium policy is arguably effective in preventing banks from increasing their risk.

(c) The existing literature on bank risk have found significant positive evidence on the relationship between bank risks, in particular financial risks with deposit insurance but few has investigated the relationship for operational risks. Only one tier 1 empirical study has investigated the relationship between operational risks and deposit insurance (see Chernykh & Cole, 2011) but found limited evidence.[12] In their study, operational risk is measured as the ratio of bank loans over the asset. However, this thesis introduces management efficiency measured by the ratio of overhead expenses to total asset; OVERHEADTA as an alternative measure for operational risk. As operational risk is intrinsic on how managers think and act, the OVERHEADTA ratio is more appropriate in measuring operational risk. The study supports with empirical evidence that operational risk taking increases significantly after the introduction of a deposit insurance system. This is the third contribution of this thesis.

[12] The results in their study reported increased operational risk after the implementation of a deposit insurance system but the increase is not statistically significant.

(d) With respect to methodology, this thesis contributes in two ways, that is estimating the annual insurance premium paid by the Malaysian banks and employing the dynamic panel model for the Islamic banks sample. Exceptional from the existing studies, this thesis estimates the annual insurance premium paid by the banks. To my knowledge, this thesis is the only study that estimates the annual insurance premium based on the deposit insurer methodology. The detail calculation is described in Chapter 3 of this thesis. This allows this thesis to investigate whether the risk-premium sensitivity improves in the risk-based premium assessment method and whether the magnitude of the annual premium paid is positively associated with the bank risk. In this respect, employing the deposit insurer methodology to estimate the annual premium is the thesis's fourth contribution.

(e) The final contribution of this study is also on methodology. This study employs more robust methodology using appropriate methods for panel data that provide more accurate results in the regression models. The use of the dynamic panel model on the Islamic banks is this study's second methodology contribution. Based on literature, the dynamic panel methodology is found to be less biased compared to alternative approaches. In the deposit insurance literature, only one recent empirical study employs the dynamic model but only on the conventional banks.[13] However, to the best of the researcher's knowledge, the dynamic panel model has yet to be tested using both the conventional and Islamic bank data. Although there is prior research that uses Malaysia to evaluate deposit insurance impact on bank risk taking (Tuan, Ying, & Nya, 2010), it focuses only on local conventional banks in the sampling frame whereas the foreign conventional banks and Islamic banks are excluded. In addition, the methodology used is the Wilcoxon signed-rank test and binomial test instead of a more sophisticated statistical test. Along these lines,

[13] Hadad et al. (2011) employ the dynamic panel model more specifically the System Generalized Method of Moment to investigate bank risk taking and market discipline in Indonesian conventional banks.

this thesis improves the robustness of the findings by including all the conventional and Islamic banks in the sample.

(f) The findings of the study would enable the Malaysian policy makers and regulators to ascertain whether the policy on the deposit insurance system implemented in September 2005 is effective in preventing excessive bank risk taking by the conventional banks as well as the Islamic banks. The findings of this thesis call for further reforms under the risk-based insurance premium system. Besides, the thesis provides empirical evidence to banking supervisors and regulators from countries with flat-rate premium to carefully consider an effective design of the risk-based premium so that the premium is positively correlated with the increase in risk and thereafter provides the incentives for banks to improve their risk management practices. This study will thus be of legitimate concern to regulators and supervisors of the financial system particularly the Ministries of Finance, central banks and deposit insurers.

1.8 Scope of Thesis

Malaysia is selected as the sample for this study for several reasons. According to a survey done by the International Association of Deposit Insurance (2010), there are currently nine countries namely Malaysia, Indonesia, Singapore, Turkey, United Kingdom, Bahrain, Jordan, Bosnia and Kuwait that practice dual banking system as well as conventional and Islamic deposit insurance system. Amongst these countries, only Malaysia has an Islamic Deposit Insurance that exists concurrently but is administered separately. In contrast, the other eight countries operate the Islamic deposit insurance together with the conventional fund while the Malaysian model manages their Islamic deposit insurance fund in

accordance with *Shariah* principles that is separate from the conventional deposit insurance fund. Moreover, the Malaysian Islamic financial sector is the most advanced among the countries that have a dual banking system and ranks higher in terms of Islamic banking assets. An important reform on the deposit insurance premium has also taken place. The risk-based premium replaced the flat rate premium. Therefore, this allows this thesis to investigate the efficacy of deposit insurance policy in reducing bank risk in Malaysian market where Islamic and conventional banking co-exist. Hence, the selection of Malaysia as a sample for this study is justified.

Notwithstanding this, the availability of the respective banks annual report is also an important consideration as banks that operate Islamic banking window reported their Islamic banking operations under the Income Statement notes to the account. The breakdown of the Islamic banking activity is only reported in the notes to the account in the respective banks individual annual report.

The study sample comprises all the conventional banks, Islamic banks and Islamic banking window that are mandatory members under the deposit insurance system for the period 2002 to 2010. The development financial institutions are excluded from the sample as these institutions are fully owned by the Government, which already have some form of implicit guarantee even prior to the introduction of the deposit insurance system. The study period of 2002-2010 is chosen because from 2002 onwards, the Malaysian conventional banks underwent and finalized significant consolidation through mergers and acquisitions. In addition, data prior to 2002 were often unavailable and therefore collecting data from earlier years was not feasible. Furthermore, from 2011 onwards the deposit insurance protection limit was increased from RM60,000 to RM250,000.

1.9 Chapter Organization

To address the research questions and achieve the objectives mentioned in Section 1.6, the study is organized into six chapters as follows.

Chapter 1 is the introduction chapter. This chapter states the overall idea of the research. It begins with the background and motivation for the study. This is followed by the definition of a financial safety net and narration on the development of deposit insurance in international and local settings. Next, the banking system in Malaysia is discussed. This chapter also presents the problem statement, research questions and research contributions. This chapter concludes by providing the structure of the research where the main contents for each chapter of the thesis are explained.

Chapter 2 is the literature review. The two distinct differences of an explicit and implicit deposit insurance system are first explained. It also offers information regarding the design features of an explicit deposit insurance system before moving to the conceptual and empirical literature on deposit insurance. Further, this chapter explains the rationale for a deposit insurance system and the potential moral hazard problem related to this deposit protection.

Chapter 3 is concerned with the hypotheses and the research design. It defines the research methodology adopted by the researcher. It also explains the research design, strategy, and methodology used in the study. It details the research processes in providing an understanding of how the researcher goes about answering the research questions to achieve the research objectives. The formulation of the research variables based on literature, as presented in Chapter 2, are also shown together with the hypotheses

developed in this research. The statistics used in analyzing the data and the method are also explained.

Chapter 4 presents and discusses the results concerning the presence of moral hazard problem by way of increased bank risk taking after the introduction of deposit insurance system for conventional and Islamic banks in a dynamic panel framework. Chapter 5 presents and discusses the results concerning the sensitivity between bank risk and the risk-based deposit insurance premium. Finally, Chapter 6 presents the main findings of this thesis. In addition, the implications, limitations and suggestions for future research are also presented in this chapter.

Chapter 2 : Literature Review

2.0 Introduction

This chapter would first elaborate on the types of deposit insurance systems and their design features. This chapter would also present the theoretical development of the study and the literature review of past studies on deposit insurance.

Section 2.1 lays down the two types of deposit insurance and the differences between explicit and implicit deposit insurance system. In addition, the four distinct design features of an explicit deposit insurance system are also described in detail.

Section 2.2 considers the theoretical development, followed by the previous empirical studies in Section 2.3 on the impact of the introduction of a deposit insurance system, particularly bank risks taking due to principle-agent moral hazard problem. Finally, the chapter summarizes and reveals the relevant research gap in the existing empirical literature in Section 2.4.

2.1 Definition and Types of Deposit Insurance

A deposit insurance system is just one part of a much wider financial safety net that includes a lender of last resort function, prudential regulations and supervision, in addition to failure resolution. It is designed to ensure the soundness of banks as well as to expand the reach of the formal banking system. Deposit insurance could be a form of full or limited guarantee to the depositors that their deposits would be reimbursed by the deposit insurer in the event of bank failures. If the guarantee is explicitly defined in the legislation of a country, then this form of guarantee is known as the explicit deposit insurance system. Otherwise, a form of implicit deposit insurance system exists from the verbal promises and/or past actions of the governments.

Generally, one could distinguish between two basic types of deposit insurance, that is implicit deposit insurance and explicit deposit insurance. If a country does not explicitly communicate that it is adopting a deposit insurance system, an implicit deposit insurance system exists in that said country. With the implicit deposit insurance system, the government is not legally bound to provide the guarantee for reimbursement of deposits if a bank fails. It is an unofficial guarantee by the government to help banks that are experiencing a crisis, in particular a bank run. On the other hand, an explicit deposit insurance is just the opposite of implicit deposit insurance through which the government obligation is well defined in laws and other regulations. Having said this, participation differs according to countries, whereby the banks' participation in the deposit insurance system could be mandatory or voluntary.

These two different deposit insurance system would be further elaborated in the following section.

2.1.1 Implicit Deposit Insurance

Implicit deposit insurance is a form of deposit insurance not explicitly governed by laws or regulations. Hence, it is a form of a government guarantee to prevent systemic failure of other banks when a bank experiences a bank failure due to insolvency or a bank run. Deposit insurance is implicit when its enforceability builds public confidence to avoid a bank run on banks that become economically insolvent. To reiterate, for implicit deposit insurance, there is no official communication by the government to the public or bankers on the deposit insurance coverage or the amount of its coverage. Therefore, the government is not legally bound to provide the deposit guarantee to depositors.

Even in an explicit deposit insurance system, there exists a form of implicit deposit insurance to avoid the contagion effects of a troubled bank crashing the entire country's economy. The onset of a banking crisis creates political incentives for any government, even those with an explicit deposit insurance system to extend guarantee coverage that exceed the limit of the explicit deposit insurance specified in the country's laws and regulations. This is evident in Malaysia when the government introduced a blanket guarantee known as the Government Deposit Guarantee from 16 October 2008 until 31 December 2010. In addition, the implicit deposit insurance system is prevalent in countries with one or more state-owned banks (Kane, 2000). Despite being unfunded, an implicit deposit insurance system is important and adopted by many countries in the world.

2.1.2 Explicit Deposit Insurance

The previous section highlighted the distinct features of implicit deposit insurance as a system, that is not officially announced by the government regarding its existence or the deposit insurance coverage. On the contrary, an explicit deposit insurance system is well defined by the government in the laws and other regulations regarding the existence of the deposit insurance system and the amount covered. The government clearly outlines its commitment through regulation concerning a specific amount of guaranteed protection on deposits. Nevertheless, both implicit and explicit deposit insurance systems could co-exist particularly in large financial crisis to optimize the social costs involved (McCoy, 2007).

The decision by the government to establish an explicit deposit insurance system is usually influenced by a number of objectives. The first objective is to provide protection to small unsophisticated depositors who, due to their incapacity or asymmetric information are unable to assess the risk of the banks where they deposit their savings. Secondly, a deposit insurance system would assist in the preservation of confidence towards the deposit taking institutions. It would reduce the probability of systemic run that could crumble the banking system as a whole. Thirdly, an explicit deposit insurance system delimits the government liability to only the established limits of coverage that is stipulated within a country's legislation. As the coverage limit is clearly specified, it reduces the government off balance sheet items or contingent liabilities than under an implicit deposit system. In addition, it provides the avenue to strengthen depositor protection in a time of crisis with a more formal mechanism. One of the strongest arguments for explicit but limited deposit insurance is that only some deposits would be protected and hence the incentive to monitor and discipline the banks would still be prevalent.

As such, contrary to implicit deposit insurance, generally an explicit deposit insurance system has four distinct design features[14], namely the funding type, sources of funding, insurance premiums systems and coverage limits and coinsurance.

2.1.2.1 Design Features: Funding Type

Explicit deposit insurance funding is divided into three, that is ex-ante funding, ex-post funding and hybrid funding. In an ex post funding, there are no advance contributions. Only when there is a failure amongst the member institutions, then the funds are collected from member institutions. While this approach is less expensive, it is less equitable for other member banks, as a failed member bank would not be able to contribute, as it is already insolvent. In an ex-ante funding, the funds are accumulated prior to a bank failure. Member institutions contribute towards the fund through insurance premium or other means. Lastly, the combined features of both ex ante and ex post funding is known as hybrid funding.

2.1.2.2 Design Features: Sources of Fund

Generally, there are three sources of funds namely government sources, private sources and a combination of both government and private sources. When required, the government sources of funding could be called upon in the form of initial contributions by the government when the deposit insurance system was established, government loans or grants. In other words, when a bank fails, the taxpayer funded the government source of fund. On the other hand, in private funding, member institutions are the main source of

[14] This four design features has been discussed by many authors. See for example Demirguc-Kunt & Huizinga (2004), International Association of Deposit Insurance Guidelines and LaBrosse & Mayes (2007).

funding through the annual insurance paid. Hence, the insured banks hold the financial burden of a bank failure. Arguably, the private insurance fund could be insolvent whereas the government fund remains solvent. Notwithstanding this, Malaysia is amongst the countries that have a combination of government and private funding sources.

2.1.2.3 Design Features: Insurance Premium Systems

For privately funded deposit insurance system, the amount each bank has to pay could be either flat rate (uniform) insurance premium or differential (risk-based/adjusted) insurance premium. The difference between the two is the premium amount paid by member institutions. With the flat rate insurance premium, all member banks paid comparable insurance premium amount notwithstanding their risk portfolio. On the other hand, differential or risk-based insurance premium incorporates the risk of each bank's assets into the premium structure. Thus, the insurance premiums that each bank pays would depend on its portfolio of risk. Therefore, it reduces cross-subsidization among member banks with low risk while at the same time discourages banks to have high-risk appetite as the riskier the banks' assets, the higher the premium they have to pay for the insured deposits.

2.1.2.4 Design Features: Coverage Limits and Coinsurance

Apart from the above mentioned three design features of deposit insurance (funding type, sources of funding and insurance premium systems), the final design feature of an explicit deposit insurance system is the limit of coverage and coinsurance.

Coverage limits could be defined as not only limiting the amount that the government would reimburse the depositors in the event of a bank failure but also the types of eligible

institutions or deposits that are covered by deposit insurance against the specified losses. On the other hand, the existence of coinsurance (as opposed to paying the whole amount covered under the insurance) in the design features of an explicit deposit insurance system requires the depositor to cover some of the losses of a bank failure. For example, a deposit is covered up to the maximum of $20,000. Nevertheless, in an event of bank failure, depositors would not be reimbursed up to the maximum protection limit of $20,000. Instead, the depositors are reimbursed lower than the maximum protection limit. Hence, the difference is the coinsured amount i.e. loss borne by depositors. On this account, the existence of coinsurance might not provide comfort to depositors because a bank run could still occur.

Overall, an effective and credible design feature for deposit insurance (see Bank for International Settlements & International Association of Deposit Insurers, 2009; International Association of Deposit Insurers, 2008) could provide banks' board of directors with a trigger alarm on risk related issues as well as an incentive for depositors to monitor their bank. Hence, market discipline would be exercised while at the same time discourage banks from venturing into risky business which would reduce the moral hazard problems. Section 2.3.1 discusses the moral hazard problems.

2.2 Theoretical Development

The main purpose of implementing a deposit insurance system is twofold, that is to prevent bank runs (Diamond & Dybvig, 1983) and promote financial stability or prevent a banking crisis (Demirguc-Kunt & Detragiache, 2002). Recent studies also showed that deposit insurance reduces the social cost of a banking crisis (Gropp, Hakenes, & Schnabel, 2011).

However, theoretical evidence (e.g. Merton, 1977; Kareken & Wallace, 1978; Hazlett, 1997; Gorton & Huang, 2004; Freixas & Rochet, 2011) showed that like other insurance schemes, deposit insurance could lead to moral hazard problem in the form of excessive risk taking by the banks. Thus, the benefits of deposit insurance are sometimes outweighed, when the problems of moral hazard are excerbated. In other words, banks' role as financial intermediaries and the alteration of incentives in the contracts between banks as the agent and depositors as the principal, transforms the riskiness of the contract, which imminently leads to moral hazard problems.

Notwithstanding this, empirical evidence suggests that a credible design feature of deposit insurance system could mitigate the moral hazard problem (see Demirguc-Kunt & Huizinga, 2004; Maysami & Sakellariou, 2008; Karas, Pyle & Schoors, 2013) and increase financial intermediation (Demirguc-Kunt & Detragiache, 2002; Chernykh & Cole, 2011). The next part of this thesis deals with the relevant theoretical framework of this study.

2.2.1 Theory of Deposit Insurance

Deposit insurance promotes financial stability by creating stabilization of deposits in the bank and assuring depositors that their deposits are protected and safe. The seminal paper by Diamond and Dybig (1983) argues that the benefits of deposit insurance in preventing bank runs relate to the main function of financial institutions as an asset transformation agent as well as a liquidity provider.

The deposit insurance system reduces the danger of bank runs and a systematic effect of a run on a bank that could cause the contagion effect to other banks, the banking system and even the entire economy of a country. Banks' role in maturity transformation enables them

to collect demand deposits like savings, fixed deposit and current account as well as raise short-term funds in the capital market. However, this demand deposits and short-term funds are utilized to finance long-term investment or assets. Hence, there is a maturity mismatch in the asset transformation process.

Notwithstanding this, the mismatch allows banks to offer higher return opportunity for risk savvy depositors who are willing to share the risk with the banks. Apart from the benefit of sharing risk with the depositors, the banks' depositors expose banks to the risk of early withdrawal of money at the same time. Thus, deposit insurance prevents the panic run by depositors by installing their confidence with the banking institution. In theory, deposit insurance systems should provide financial stability in the banking system by decreasing the risk of bank runs.

Even if a crisis occurs, at least the deposit insurance system acts as "risk minimizer" by protecting some of the majority depositors' deposit. Anticipating that their deposits are guaranteed under a deposit insurance system, depositors without immediate consumption needs will not rush to withdraw their money in the bank, thereby averting a contagious bank run and reducing the social costs of a banking crisis. Bank runs could lead to systemic banking system failures that incur a real cost. Hence, to prevent this contagious bank run, the government backed deposit insurance is the optimal solution. The restoration of depositors' confidence is crucial as it not only encourages the individuals without banking arrangements to deposit money in the bank but also stretch the banks' size in the form of increased deposits (see Chernykh & Cole, 2011).

Several historical cases appear to support the argument for the implementation of a deposit insurance system that prevents bank runs and their contagious effects. For instance, none of

the member banks under the Indiana deposit insurance system experienced bank failure during its 30 year history (Calomiris, 1990). Added to this is the success story of the FDIC in reducing the occurrence of bank failures from 50 a year in 1939 to 17 a year in 1944. It continued to maintain an average of 12 a year until 1982, before the Savings and Loan Association crisis (Matthews & Thompson, 2008). Thus, not only in theory but also the historical events support the view that deposit insurance system prevents bank runs. Despite creating moral hazard, deposit insurance as a tool for depositor protection has become an important feature of most banking systems to reduce the instability and minimize the probability of crises (see Talley, 1994; Cull, Senbet, & Sorge, 2005; Maysami & Sakellariou, 2008; Angkinand, 2009; DeLong & Saunders, 2011).

In the literature, the three main rationales for adopting a deposit insurance system are preventing a run, ensuring financial stability and reducing the social costs of a bank failure. If the deposit insurance system is necessary for financial stability but possess a danger of systemic bank runs, then incentives-compatible risk control tools are required. Credible deposit insurance system accompanied by stringent regulatory framework not only prohibit excessive risk taking by banks but also limits the government's commitment to depositors as well as ensures increased financial intermediation of the banking system (see Cull, Senbet, & Sorge, 2005; Maysami & Sakellariou, 2008; Angkinand, 2009; Karas, Pyle & Schoors, 2013; Chernykh & Cole, 2011).

One could argue that an element of ambiguity (in instances where no explicit deposit insurance system is in place) is advantageous as people would want to protect themselves from loss as they are uncertain whether the Government would step in (Talley, 1994). On the other hand, the consequences of ambiguity could be detrimental as well because

depositors, debtors and bankers might believe that more insurance is provided and hence take greater risks, exposing themselves to moral hazard problems.

Deposit insurance does exacerbate the moral hazard problem (see Kareken and Wallace, 1978) when unaccompanied by a stringent regulatory framework that permits excessive risk taking by banks. Thus, regulators must figuratively step into the shoes of depositors to control this moral hazard problem not only in the conventional banks but in the Islamic banks as well. Regulators attempt could be through the use of various regulatory controls like imposing minimum capital requirements and a risk-based deposit insurance premium that are aimed at forcing the bank to internalize the cost of increased risk. The following section would provide an overview of moral hazard problem in general and in the context of Islamic banking.

2.2.2 Moral Hazard: The Deposit Insurance Problem

In an agency framework, a moral hazard problem or sometimes referred as "hidden action" is an action of one party to a transaction (agent) that is unobservable by the second party (principal) who authorized the transaction (Kreps, 1990). Krugman P. (2009) defines moral hazard as "the possibility that you will take less care to prevent an accident if you are insured against it". To fully understand moral hazard and its importance in financial economics, a brief description of the principal agent theory is discussed in the next paragraph.

The agency theory, also referred to amongst others as the principal-agent theory or agency problem, is concerned with resolving two major principal and agent (agency) problems that could occur in the agency relationship. It involves the risk, which is a problem for the

principal to verify that the agent has behaved appropriately to serve the principal interest rather than the agent's interest. In addition, it includes the problem of risk sharing when both of them have different attitudes toward risk. Scholars in various fields including finance and banking have used the agency theory (e.g. Fama, 1980) to describe the principal and agent problems derived under incomplete or asymmetric information that leads to the potential problem of moral hazards.

Thus, dealing with financial intermediation, the nature of banking is such that it suffers from this incentive problem between the principal and agent. In general, the agency theory assumes that agents would not necessarily act according to the principle instruction as agreed. According to Heffernan (2005), the agency theory could be applied to explain the nature of contracts between the principal and agent in the following manner:

i. the shareholders of a bank (principal) and its management (agent);

ii. the bank (principal) and its officers (agent);

iii. the bank (principal) and its debtors (agent); and

iv. the depositors/creditors (principal) and the bank (agent)

2.2.2.1 Moral Hazard in Banking

Concerning deposit insurance, the interesting aspect of the principal agent theory revolves around the agent's risk behavior in alliance with the principal. Information is the main concern in the principal agent framework. In the banking sector, this asymmetric-information problem could arise when there exists a deposit insurance system to prevent bank runs. Moral hazard in banking could stem from the relationship between banks and

borrowers as well as the insurer. The moral hazard problem would likely reduce depositors' effort to control their banks (market discipline) and banks' might tend to finance very risky projects with deposits, reap the benefits if the project succeeds.

Under the financial intermediation theory, the intermediary and payment functions explain why bank exists (see Allen & Santomero, 1997). The presence of asymmetric information makes it viable for household and firms to deposit funds with banks instead of lending directly to potential borrowers. Asymmetric information is prevalent in any financial transactions, as one party may not have complete information withheld by the other party (investors/debtors) and vice versa. Hence, banks help depositors or investors from adverse selection of undesired risk exposure by screening prospective borrowers.

Although the prospective borrowers have been selected, the bank faces another asymmetric problem if borrowers conduct diverted from the original purpose of funds. When the loans are disbursed to borrowers, banks no longer have control of the funds if the manager decides to divulge the borrowed funds to another project with higher risk exposure but promises greater return. This increase change in borrower's risk appetite is called moral hazard. Notwithstanding this, bank too is the potential cause of moral hazard.

In banking, moral hazard occurs when the bank does not execute the desires or commands of the depositor. Likewise, when the incentives of the depositor and bank change, it alters the riskiness of the contract and raises the moral hazard problem. The moral hazard problem from the banks' position also happens under asymmetric information. Banks usually have more information about their actions or intentions than the depositor as the depositor usually cannot completely scrutinize the banks. Similarly, if the depositors' lackadaisical attitude to monitor the bank's activities known to the bank, the riskiness of the

contract also altered as the bank may divulge in riskier activities than it would in the presence of close monitoring. This exhibits the classic agency problem of moral hazard.

In the agency analogy to bank deposits and the deposit insurance system, both banks and depositors are subjected to moral hazard. Moral hazard alters the willingness for both banks and depositors to assume greater risk. The moral hazard behavior of the banks can be observed in the form of increased risk taking. The main objective of deposit insurance system is as a depositor protection that eventually protects the banking system from bank runs or market liquidity failures that are compared to a bank run.

In confronting with information asymmetries, it is vital to provide protection for small depositors who are likely to cause a bank run (Dewatripont & Tirole, 1994). These small depositors cannot correctly assess the risk they take when depositing their savings in a particular bank or do not have the incentive to monitor banks. Nevertheless, like any other insurance, deposit insurance system creates a moral hazard by reducing depositors' incentives to monitor the bank risk taking, as depositors are free from the consequences of their action and the banks' action. If not properly addressed the lack of depositors disciplining role will encourage the banks to alter their risk appetite.

In theory, deposit insurance is clearly good (Diamond & Dybvig, 1983) in creating banking system stability. Unfortunately, deposit insurance can generate moral hazard and can encourage banks to take excessive risk. Merton (1977) is the first to quantify the moral hazard problem. He identifies the value of deposit insurance as the equivalent of the US Federal Deposit Insurance put option. At that time, a flat rate insurance premium was charged irrespective of the risk of the banks. The flat rate premium provides the incentives for banks to alter their riskiness because they are only incurring part of the losses if the

assets become non-performing. Hence, moral hazard may even occur in normal times if the incentives increase risk taking is sufficiently attractive. Rolnick (1993) also illustrates how deposit insurance distorts bank's behavior and creates moral hazard.

Karels and McClatchey (1999) stated that:

"Many financial economists have argued that the crisis in the thrift industry in the 1980's was the result of inattention to the moral hazard problem by regulators. Studies by Kane (1989), Mckenzie, Cole, and Brown (1992) and Cole (1993) suggests that moral hazard behavior was responsible for a significant portion of S&L losses"(p. 106).

The above statement is in contrast with the benefit of deposit insurance in maintaining financial stability. Notwithstanding this, the moral hazard problem purportedly created by regulators at that time could be minimized by ensuring a credible design feature of deposit insurance. During the periods under study, the insurance premium was charged on a flat rate basis rather than risk-based premium that could hinder the incentive by banks to increase their risk taking. The moral hazard problem surfaces with the presence of deposit insurance as the insured banks leverage on the deposit insurance and have the incentives to increase risky activities while the depositors forego their monitoring role on the banks risky activities as their deposits are guaranteed. Thus, timely government intervention may prevent the risk of failure shifting from the banks to the deposit insurer, depositors and even the taxpayer via government bailout of banks.

While deposit insurance can stabilize a bank's deposit base and contagious bank run, deposit insurance can create potential instability. In the presence of deposit insurance, depositors will not exercise market discipline as they know that their deposits with the banks will be repaid and require no risk premium on the funds than otherwise. Similarly,

banks responded to this risk-free interest rate by taking greater risks that correspond to higher returns. Thus, deposit insurance can undermine market discipline (depositors) and financial discipline (banks) by subsidizing both depositors and banks risk taking.

2.2.2.2 Moral Hazard: Islamic Banking

Islamic banking is operationalised through Shariah compliant contracts. Due to this contractual setting where asymmetric information is always possible, from an agency framework, moral hazard may also occur in Islamic banks. The prohibition of uncertainty (*gharar*) and freedom of contract are the two dimensions that evolved the risk concept in Islamic banking (Obaidullah, 2005). The element of uncertainty can arise due to asymmetric information, illicit profits, speculation or gambling and even the riskiest of a business or project itself (Kettell, 2011). Therefore, Islamic banks operation warrants high level of disclosure and transparency. This information disclosure minimizes uncertainty and risk in Islamic banking plausibly minimised moral hazard.[15] Notwithstanding this, undertaking some degree of risk based on educated analysis and understanding of the risk involved is permissible and accepted as business norm under an Islamic contract. This is because the elements of uncertainty associated with the risk have been eliminated as participants of contracts have sufficient information about the future performance of an investment decision.

In Islamic banking, as a general principle, all contracts are permissible unless prohibited by the *Shariah* (Kettell, 2011). Therefore, due to this contractual setting, from an agency framework, moral hazard is also present in Islamic banks. Parties in the contract are open

[15] Moral hazard occurs when there is lack of incentives to protect against risk when one is protected from its consequences.

to moral hazard problem due to asymmetric information. For instance, in *Mudharabah* contract, the *mudarib* (agent/borrower) possess better information on the performance of his business than the *rabb al-mal* (capital owner/bank) as the *mudarib* is involved in the daily business operations and his action determines the success of his business. The mudarib can utilize this strategic position to his advantage by cheating or deviating away from the original purpose of the financing after signing a *Mudharabah* contract. In *Mudharabah* contract, although the capital is provided by banks, there is no guarantee provided for the return of the capital, as it is not a loan.

Similar to conventional banks, Islamic banks solicit deposits from depositors, invest these investment deposits on behalf of their depositors, and share the agreed profit and losses. The theoretical underpinning of Islamic banks' deposit contract under *Shariah*[16] such as *Qard, Wadiah, Mudharabah* and *Murabahah* are unique as they feature a different risk and return. Nevertheless, the incentives for Islamic banks to be involved in riskier business are constrained by the *Shariah* principles which advocate financing on real assets. It is plausible to mention that due to it being linked to asset financing according to the *Shariah* principles, Islamic banks are less affected by the financial crisis (Hasan and Dridi, 2010).

Islamic banking introduced greater discipline into the financial system by requiring the banks to share the profits as well as the risks involved. This risk-sharing feature should impose a higher level of disclosure and transparency in the Islamic banks in comparison with the conventional banks. The disclosure and transparency allowed market discipline to take place which would mitigate the moral hazard problem. Moreover, features in *Shariah* principles provided built-in checks and balances, which ensure the Islamic banking

[16] See Shanmugam, Alam and Zahari (2008) for further reading of Islamic banking terminology and definition.

stability. By abiding to the *Shariah* principles, Islamic banks appear to be safe with higher asset quality and better capitalized than the conventional banks (Beck, Demirguc-Kunt, & Merrouche, 2013; Ariss, 2010). Thus, moral hazard could be less prominent than in the conventional banks (El Tiby, 2010) even without deposit protection and no increased risk after the introduction of deposit insurance system. Subsequently, the Islamic banks' behavior towards risk are expected to be different from the conventional banks, even with the existence of explicit deposit insurance protection.

Like any other business in an economy, risk is a consequence of choice under uncertainty. Unlike the conventional banks, the Islamic banks endorsed risk sharing and diversification rather than risk transfer (debt financing) in its financing instruments and contacts (Mirakhor, 1989). Sharing allows risk to be spread among the Islamic banks and its customers. By sharing risk, Islamic banks have the incentives to protect against risk as similar to the borrowers; the Islamic banks are not protected from the consequences of risk or uncertainty. Therefore, even with the introduction of deposit insurance moral hazard is mitigated as similar principles are still endorsed for all financing of the economic activities.

2.2.3 Deposit Insurance: A Rationale

Notwithstanding the moral hazard issue discussed above, there still is a need for a deposit insurance system. If deposit insurance is the reason for moral hazard (i.e. increases in bank risk) as discussed in the previous paragraph, then why is there a need for it? The seminal work by Diamond and Dybvig (1983) showed that a run could even cause a healthy bank to default. As the banking landscape is changing rapidly following liberalization, banks rely on market forces and hence become more vulnerable and submit to greater instability

(Caprio & Honohan, 1999). In response to the 1999 Asian currency crisis, the Financial Stability Forum was formed by the G7 Finance Ministers and Central Bank Governors to promote global financial stability. In fact, in April 2008, this forum recommended that deposit insurance be incorporated as part of the robust mechanism that dwells with financial institutions in distress. Liberalization and globalization emphasized the need to regulate financial institutions beyond their institutional risk, that is the systemic risk they posed towards the financial system (Nijskens & Wagner, 2011).

Banks' liquidity transformation function makes them vulnerable to runs as bank finance long-term assets via short-term deposits. Deposit insurance instills depositors' confidence in preventing a run that could create systemic instability in the financial system. It could be a powerful source of financial stability depending on the deposit insurance built-in incentives together with prudential regulations and supervision (Demirguc-Kunt & Detragiache, 2002). The moral hazard effects of deposit insurance could be overcome through the design features of the deposit insurance and other regulatory initiatives including risk-based premium pricing, reserve requirements, partial insurance coverage and capital requirements aimed at curbing excessive risk taking. The generally accepted view in literature concurs that in mitigating moral hazard, the deposit insurance design features should have the incentives to prevent banks from taking excessive risk.

The outcomes of bank runs could be detrimental as it not only affects the stability of the entire economy but reduces financial intermediation. For example, during the credit crisis in 2007, Northern Rock, a British bank experienced a bank run (depositors' withdrawing deposits). The subprime crisis sparked fears among depositors that the bank might become insolvent. The withdrawal of deposits from its depositors disrupted Northern Rock intermediation function whereby the bank has sought and received a liquidity support

facility from the Bank of England. On the contrary, more recently, the evidence in Chernykh and Cole (2011) study revealed that in a stable banking system, financial intermediation is greater for banks that have been long under the explicit deposit insurance system.

The following section would discuss the empirical evidence with regard to the implementation of an explicit deposit insurance system.

2.3 Empirical Evidence

Despite a continuing debate among the academics, policymakers and others over the tradeoff between the negative and positive impacts of deposit insurance system for almost two centuries, the results are still inconclusive on the implications of implementing deposit insurance system due to the moral hazard problem created by deposit insurance. The debate on deposit insurance schemes started as early as in 1800s when the US government adopted various deposit insurance system in their states to ensure the stability of their state banking system (Calomiris & White, 1994). Some studies contend that the costs of moral hazard are too great and that deposit insurance should be scaled back, reformed or, at the extreme, perhaps be eliminated altogether.

The following section would neutralize this contention by providing empirical evidence on the moral hazard implications, the importance of credible design features of deposit insurance system to mitigate the moral hazard problem and finally justify that a credible deposit insurance would lead to financial stability as well as financial intermediation.

2.3.1 Deposit Insurance and Moral Hazard

Moral hazard in banking could be viewed from two sides, which are the banks and depositors. However, this research is only concerned with the banks' moral hazard problem. In passing, the literature review also includes market discipline by depositors. The number of emerging or developing countries (including Malaysia) implementing explicit deposit insurance since 1974 has steadily increased (see Demirguc-Kunt, Kane, & Laeven, 2008; Demirguc-Kunt & Sobaci, 2001; IADI website). In fact, Demirguc-Kunt and Detragiach (2002) conducted a prominent study to justify that moral hazard matters. Their findings from 61 countries in the period 1980-1999 showed international evidence that a country would experience a likelihood of banking instability in the form of a banking crisis in the presence of an explicit deposit insurance system.

The benefits of deposit insurance are the protection of small depositors, the maintenance of public confidence in the banking system and the minimization of the broader economic consequences that could accompany bank failures (Diamond and Dybvig (1983). Unfortunately, deposit insurance could generate moral hazard and encourage banks to take excessive risk (Merton, 1977). By absorbing part of the losses when a bank fails, deposit insurance is equivalent to a subsidy for bank risk taking. Deposits insurance obstructs market discipline by the depositors on the banks' risk taking activities. Studies suggest (see Demirguc-Kunt & Huizinga, 2004) that the presence of market discipline curb bank's incentive to take excessive risk. Depositors could punish bank to limit the banks' risk taking by way of either withdrawing their deposits or demanding higher interest rates that commensurate with the risk taken by the banks (Peria & Schmukler, 2001).

The Diamond and Dybvig (1983) and Kareken and Wallace (1978) models respectively have isolated the benefits and costs of deposit insurance. In relation to this, there exists concern among researchers and academics (e.g. Demirguc-Kunt & Detragiache, 2002; Demirguc-Kunt & Huizinga, 2004; Maysami & Sakellariou, 2008; Angkinand, 2009; Ioannidou & Penas, 2010; DeLong & Saunders, 2011; Hadad et al., 2011) about balancing deposit insurance's role as "risk minimizer" as well as mitigating the moral hazard problem associated with it. A vast empirical literature exists to analyze the implications of moral hazard on deposit insurance.

The prevention of financial and banking crisis justifies the existence of financial safety nets. Thus, deposit insurance serves as the most common tool used by many to protect the majority of the unsophisticated depositor and ensuring stability of the banking system. Although an explicit and formal deposit insurance scheme is considered as an important device to ensure bank stability, empirical studies provide conflicting results on the impact of explicit deposit insurance schemes on bank risk-taking behavior.

As early as in the 1990s, empirical evidence showed that deposit insurance posed the problem of moral hazard. A study by Kansas, Wheelock and Wilson (1995) showed that deposit insurance membership increased the probability of bank failure, consistent with the theory that some form of insurance or guarantee provided banks the incentives for higher risk taking. Later, Laeven (2002) study argued that deposit insurance encouraged higher risk taking by banks and reduced the incentives of depositors to monitor banks. Using estimates of the value of the deposit insurance premium[17] as a proxy for risk taking, he concluded that the banks' incentive on risk taking would differ depending on the governance structure and institutional environment. Added to that, his study revealed that

[17] He employs the Merton (1977) put option model of deposit insurance to estimate the deposit insurance premium.

the bank with concentrated private ownership and state-owned operating in a weak institutional environment, particularly in developing countries, tend to take higher risk in the presence of deposit insurance.

Hovakimian et al. (2003) reached a similar conclusion when they argued in their study that moral hazard problem caused by deposit insurance shifted the risk exposure by banks or even the depositor to the government (as deposit insurer) especially in a poor institutional environment. In the literature, this is sometimes known as subsidizing risk taking. Likewise, Demirguc-Kunt and Huizinga (2004) employed cross country data for 30 countries over the period 1990-1997 and found that the explicit deposit insurance design features vary internationally, and that would have different impacts on the banks risk taking behavior. Their paper also highlighted that more empirical studies on deposit insurance are needed to make better informed policy recommendations to mitigate the tradeoff between protecting depositors and at the same time increase bank risk taking. Similarly, another cross-country study showed that explicit deposit insurance might encourage banks to take excessive risks (e.g. Wheelock, 1995; Demirgüc-Kunt and Detriagache, 2002; Hovakimian et al.,2003).

A number of studies have considered risk adjusted insurance premium requirement to mitigate the moral hazard problem. For instance, Cull, Senbet, and Sorge (2005) suggested that amongst others, to affix the premium amount to the banks' risk portfolio rather than a flat premium for all. They argued that the moral hazard problem could aggravate in a generous deposit insurance system in countries lacking adequate banking regulations and supervision. Thus, due to the moral hazard problem, deposit insurance might be an obstacle for financial system stability. A call for more empirical research particularly using bank

level data is timely (Demirguc-Kunt & Huizinga, 2004; Chernykh & Cole, 2011), to analyze the impact of deposit insurance on bank risk taking.

There are very few empirical studies on the moral hazard implication of an explicit deposit insurance system in the past ten years, which look at data for their studies on a bank-level particularly for the banking industry in developing countries. Recently, there have been a number of studies on deposit insurance that examined country-level data on banking in developing economies. Chernykh and Cole (2011) affirmed this by pointing out to a lack of empirical material for the past two decades that examined the implication of deposit insurance on bank level data. Chernykh and Cole (2011) conducted a study on Russian banks while Ioannidou and Penas (2010) did a comparison study on bank risk-taking pre and post implementation of deposit insurance system for banks in Bolivia.

Hadad et al. (2011) studied how market discipline responded to the introduction of explicit deposit insurance during the presence of implicit deposit insurance system in 1998 and explicit deposit guarantee in 2005. Using data from 104 conventional banks in Indonesia during the period 1995-2009, they found that bank risk taking improved despite weaken market discipline after the introduction of the explicit deposit insurance in contrast to the period of implicit deposit insurance.

Most studies on the moral hazard implication of deposit insurance focus on US and European banks, while empirical evidence from developing countries has remained limited. In a study of the Turkish banking system, Yilmaz and Muslumov (2008) explained that moral hazard exists, especially among local banks. Using the Wilcoxon and Binomial test, their results described that deposit insurance could distort market discipline and hence change the banks' behavior in taking excessive risk. Meanwhile, the study by Ioannidou

and Penas (2010) in a Bolivian setting, provided strong evidence that banks are more likely to increase risk taking by initiating riskier loans after the introduction of deposit insurance. Employing the credit quality of bank loans to analyze the effect of deposit insurance on bank risk taking, their study also demonstrated that banks with a high share of large depositors take less risk before the introduction of deposit insurance in comparison to after the introduction of deposit insurance system. Their findings indicate that the large depositors exercise market discipline.

A study on the impact of deposit insurance system towards a Malaysian banking system remains substantially under researched. The two published papers are a descriptive study (Devinaga Rasiah & Peong, 2011) and an empirical study (Tuan, Ying, & Nya, 2010). The empirical study by Tuan, Ying, and Nya (2010) demonstrated deterioration in interest rate risk and risk weighted capital ratio post deposit insurance system. Nonetheless, there is no significant excessive risk taking by the banks after the introduction of the deposit insurance system in the form of credit risk and liquidity risk. Notwithstanding this, their study has several shortcomings that could be addressed by future research. Firstly, further study should include a longer period of study than the current period of 2004-2007. Secondly, to increase the robustness of the study, the sample frame should include all banks that are protected under the deposit insurance system. This includes the foreign conventional banks and Islamic banks as well as the local conventional banks. Lastly, employing a multivariate regression test other than the Wilcoxon signed-rank test and binomial test would draw more conclusive and generalized results.

Another prominent moral hazard problem of deposit insurance is reduced market discipline that leads to increased bank risk taking (e.g. Laeven, 2002; Ioannidou & Penas, 2010; DeLong & Saunders, 2011). To put it simply, depositors are no longer concerned about the

state of bank's soundness and hence surrender their market monitoring exercise or "policing" efforts. As a result, depositors are no longer a source of threat to the banks, and this encourages the banks to indulge in excessive risk taking (e.g. Forssbaeck, 2011; DeLong & Saunders, 2011; Ioannidou & Penas, 2010). In the Asian case, Hadad et al., (2011) argued that deposit insurance increases bank risk taking when depositors relinquish their disciplining role to monitor the bank. By quantifying market discipline as higher deposit rates, they deduced the existence of an inverse relationship between market discipline and blanket guarantee, as well as the capital adequacy ratio. Their paper also highlights that listing a bank in the capital market, either foreign or locally owned bank is a good way to encourage market discipline.

Lastly, in a study of 800 Russian banks, Chernykh and Cole (2011) found that the implementation of voluntary explicit deposit insurance system increased moral hazard problem in the form of increased risk-taking. Their results showed that financial risk increased significantly after the introduction of deposit insurance but there was limited evidence for operational risk taking. However, their findings also showed that the banks' level of deposits and deposit to asset ratio rose the longer the duration a bank had opted into the deposit insurance system, suggesting increased bank financial intermediation. Further, they concluded that the deposit insurance system provided a level playing field between state-owned banks and privately owned banks. In Russia, the state-owned banks enjoyed full government guarantee prior to the introduction of a voluntary deposit insurance system in December 2003.

Despite the implication of moral hazard on the implementation of a deposit insurance system, some empirical studies have found that explicit deposit insurance reduces the moral hazard problem (bank riskiness) or has no moral hazard impact on it. Karels and

McClatchey (1999) found no evidence that the credit unions risk taking behavior deteriorated post deposit insurance system. Their study examined the impact of deposit insurance within the US credit union industry. In the European case, Gropp and Vesala (2004) showed that explicit deposit insurance in the European banking system has reduced banks' risk taking through a decrease in leverage risk. They argued that the limited government commitment in the design of explicit deposit insurance might mitigate the moral hazard problem. Hence, their evidence pointed towards supporting the implementation of explicit deposit insurance as a risk reducing effect rather than implicit deposit insurance.

Consequently, Maysami and Sakellariou (2008) reported similar findings. Their study showed that countries with liberalized financial sectors would have a more stable banking sector as deposit insurance system lowers the cost of moral hazard by reducing vulnerabilities. In a study of 47 banking crisis episodes in 35 industrial and emerging markets, Angkinand (2009) showed that deposit insurance had no implications of moral hazard problem. Instead, they argued that a higher coverage of deposit insurance mitigated the moral hazard problem. Consistent with Demirguc-Kunt and Detragiache (2002) and Cull, Senbet & Sorge (2005), concluded that some restriction on bank activities together with prudential bank regulations and supervision, support the role of deposit insurance as a financial safety net tool that avert bank runs as well as reduce banks incentives to take excessive risk.

More recently, the study by Forssbaeck (2011) supported the view that the presence of explicit deposit insurance reduces bank risk taking. In a study of US, DeLong and Saunders (2011) analyzed 60 publicly traded financial institutions that consist of banks and trusts over the period 1932-1935. Their study showed that following the introduction of

deposit insurance, banks in general became more risk oriented. However, this was because the insurance premium during that period was based on a flat rate premium. The US implemented an explicit deposit insurance system in 1933 with a flat rate premium before converging to the risk-based premium in 1993. Notwithstanding this, their results also showed that after the introduction of deposit insurance, depositors demonstrate higher confidence as they were less prone to withdraw their deposits from weaker banks, thereby increasing the overall stability of the banking system.

Using panel regressions on several hundred banks worldwide over the period 1995–2005, Forssbaeck (2011) demonstrated the effects of moral hazard when market discipline is lacking on the part of creditors and shareholders in the presence of limited deposit insurance. The results of his baseline regressions confirm that the creditors policing role reduces bank risk in the presence of limited explicit deposit insurance. In the agency-cost model, he found that banks with higher leverage are closely under the watchful eyes of their creditors and shareholders' although this was not evident during the financial crisis. His study partially confirms that ownership structure has a conditional effect on risk taking.

2.3.2 Deposit Insurance and Financial Stability

In the short run, a deposit insurance system is a common antidote that reduces the occurrence of bank runs (Diamond & Dybvig, 1983) that creates banking system instability. Furthermore, a deposit insurance system is also a tool to ensure the stability of the banking system, which could eventually lead to increased financial intermediation (Demirguc-Kunt & Detragiache, 2002). An explicit and formal deposit insurance scheme is considered as an important device to ensure bank stability.

Relatively, little empirical evidence has tested the implications of Diamond and Dybvig (1983) analysis of a bank run. This is partly due to insufficient data on the occurrence of bank runs. However, an interesting exception is the study by Iyer and Puri (2008). Their paper used micro depositor data in the Indian state of Gujarat to describe a run when a neighboring bank failed. In line with Diamond and Dybvig prediction, they too showed that the implementation of deposit insurance helps limit the potential for bank runs, thus, ensuring financial stability. Their findings further illustrated that bank run have a long lasting effect. Preventing a run is crucial, as when a bank run occurs only a few depositors who run will return to the bank, which results in a reduction in banks' depositors' base. Moreover, they identified that the social network effect is a potential important factor in exacerbating the contagion effects of bank runs.

In estimating the probability of a banking crisis, Maysami and Sakellariou (2008) proved that explicit deposit insurance increased financial stability in a financially liberalized environment. Their multivariate logit results showed that the benefits of explicit deposit insurance in preventing self-fulfilling bank runs prevail over the costs of moral hazard, resulting in a more stable banking system. Likewise, DeLong and Saunders (2011) provided the evidence that deposit insurance increased the overall stability of the banking system. They argued that deposit insurance also reduced discrimination by depositors between stronger and weaker banks as the presence of deposit insurance created a level playing field among deposit taking institutions. In this circumstance, even with reduced depositor discipline, it still provides greater banking stability. Finally, during the 2007/2008 financial crisis, countries that implemented deposit insurance system were found to have lower bank risk and were systemically stable (Anginer, Demirguc-Kunt, & Zhu,

2012). Their study proposes that the deposit insurance system provides stability during the financial crisis.

2.3.3 Deposit Insurance and Financial Intermediation

The restoration of depositors' confidence is crucial as it not only encourages the individuals without prior banking arrangements to deposit money in the bank but also stretch the banks' size in the form of increased deposits (see Chernykh & Cole, 2011). A guarantee of depositors' deposit, especially covering the majority of unsophisticated ones, would instill confidence and thus remove any incentive to participate in a bank run. When the majority of these depositors are confident with the banks, panic withdrawal could be averted. Hence, by preventing bank run, banking stability would also be enhanced for financial intermediation. This supports the view for deposit insurance as a financial safety net tool in preventing bank runs by creating financial stability and thereafter increased financial intermediation.

The outcome of bank runs could be detrimental as it not only affects the stability of the entire economy but might reduce financial intermediation. For example, during the credit crisis in 2007, Northern Rock, a British bank experienced a bank run (depositors' simultaneously withdrawing deposits). The subprime crisis sparked fears among depositors that the bank might become insolvent. The withdrawal of deposits from its depositors disrupted Northern Rock intermediation function, and the bank had to seek and received a liquidity support facility from the Bank of England. More recently, the empirical evidence in Chernykh and Cole (2011) study revealed that in a stable banking system, financial

intermediation is greater for banks that have been long under the explicit deposit insurance scheme.

Deposit insurance reduces depositors' incentives to monitor the bank. Explicit deposit insurance creates a more developed banking system in a country with good institutional framework (Cull, Senbet, & Sorge, 2005) that allows for increased financial intermediation. Very few empirical studies explain the benefits of deposit insurance. Although Demirguc-Kunt and Detragiache (2002) found that an explicit deposit insurance scheme in countries with weak institutional environment is likely to lead to incidences of banking crisis, they also highlighted the benefits of deposit insurance in their findings. They pointed out that introducing an explicit deposit insurance system "may create the basis for a more developed banking system that performs more financial intermediation". A cross-country data over the 1980-1995 period was examined by Cull (1998) for evidence on the benefits of deposit insurance towards financial intermediation of a country. His findings suggest that deposit insurance might increase depositor confidence in the banking system which could lead towards increased financial intermediation.

The resulting evidence in Cull (1998) mirrors the study by Chernykh and Cole (2011) who examined the positive effect in the Russian banking system of the explicit deposit insurance system on the depositors and banks. Their findings suggest that the banks' financial intermediation increased in the presence of explicit deposit insurance system as evident from the increase level of bank deposits. Apart from that, Maysami and Sakellariou (2008) found that explicit deposit insurance provides stability and reduces the probability of banking crisis occurrence, especially in countries with developed and liberalized banking system. Therefore, it provides a conducive environment for financial intermediation.

2.3.4 Deposit Insurance and Operational Risk

Most studies on bank risk in the literature have found significant positive evidence on the relationship between bank financial risks (e.g. Forssbaeck, 2011; DeLong & Saunders, 2011; Ioannidou & Penas, 2010) but not specifically on operational risks. To the best of the researcher's knowledge, only Chernykh and Cole (2011) have investigated the relationship between deposit insurance and operational risks. Their study examines the changes in operational risk as measured by the ratio of bank loans to assets before and after the introduction of explicit deposit insurance system. However, they found limited evidence that operational risk increased after the introduction of deposit insurance in Russia. On the other hand, the use of accounting data to measure operational risk is also conducted in the study by Lei and Tzu-Pu (2011) on bank efficiency, that measures operational risk as stock return volatility, return on asset volatility and equity to asset ratio.

2.3.5 Deposit Insurance and Its Design Features

Deposit insurance is certainly a "risk minimizer", preventing panic runs by strengthening public confidence and hence supporting the stability of banking operations. However, the deposit insurance system certainly cannot absolutely stop a banking crises or be the guarantee of banking stability. The financial crisis in 2007/2008 brought renewed attention to the concept and practice of deposit insurance by regulators around the world. Many countries that were yet to adopt or delayed in adopting a deposit insurance system had to do so in the wake of the crisis. During the crises, the prevention of bank runs to ensure financial stability was a vital concern for governments rather than the problem of moral hazard. Australia, for instance, was among the last few countries to implement an

explicit deposit insurance system in October 2008. Although deposit insurance is widely accepted, there is no universal design for a deposit insurance system. The designs and institutional arrangement of deposit insurance vary according to the objectives of a deposit insurance system.

Recognizing that the government would rescue the banks and reimburse the depositors, more risk-loving banks might be attracted to enter the market. This is due to the fact, that there exist no differential costs in obtaining funds from the market among banks with good risk management or otherwise. A mandatory deposit insurance mitigates this adverse selection among banks (Demirguc-Kunt & Detragiache, 2002). Eventually, it would reduce the undesirable outcome where solvent and stable banks could lose their market share to the unstable banks due to regulatory arbitrage.

Likewise, with the implementation of deposit insurance, the depositors might not have the incentive to monitor the banks' activities or check their solvency. A low coverage amount is less effective in restoring depositors' confidence and might defeat the purpose of having a deposit insurance framework where bank runs could occur. However, moral hazard problem could be greater with a higher coverage amount specified. Hence, an effective coverage amount should be in place to balance between restoring depositors' confidence and reducing moral hazard. One could also argue that without explicit deposit insurance the depositors would diligently monitor the banks' activities (Hadad et al., 2011) and avoid depositing money with a fragile bank to avoid bearing risk in the event of the bank's failure.

In the early stages of introducing explicit deposit insurance system, most countries introduced an insurance premium that did not commensurate with risk. Hence, the moral

hazard problem became worse, as there is no incentive for banks to avoid excessive risk in their portfolio. Literature suggests that the risk-based premium method could mitigate the moral hazard problem (see for example Cull, Senbet, & Sorge, 2005; Demirguc-Kunt & Detragiache, 2002; Demirguc-Kunt & Huizinga, 2004). The International Association of Deposit Insurance survey as at 9th September 2011, revealed that only 24 countries including Malaysia, introduced a risk-based deposit insurance premium replacing the flat rate premium to mitigate the moral hazard problem. A sensitive risk-based premium towards bank risk would prompt the insured banks to think twice before embarking in a higher risk activity as the higher the risk in their asset portfolio the higher the premium the insured banks have to pay. This is seen as some sort of penalty to the banks if they divulge in risky activities. In addition, it is believed that because of this penalty, banks would have the incentives to improve their risk management practices.

In many countries, especially prior to the 1998 financial crisis, there usually existed an unofficial or also known as the implicit deposit insurance system. This situation also applies to Malaysia. Malaysia only introduced an explicit deposit insurance system on 1 September 2005. Prior to that, there existed an implicit deposit insurance system. In addition, the insurance premium was not risk rated until in 2008. In practice, whenever appropriate, countries modify the original design features of their deposit insurance system to ensure that the new and better design could be an effective tool to mitigate the moral hazard problem. Similarly, the introduction of a credible(see Bank for International Settlements & International Association of Deposit Insurers, 2009; International Association of Deposit Insurers, 2008) explicit deposit insurance system is pertinent to not only limiting the government's commitment to depositors, but also mitigating moral hazard problem, thereby ensuring increased financial intermediation of the banking system. Thus,

the design of deposit insurance is crucial in ensuring banking stability rather than the duration of the deposit insurance system implementation itself.

It is obvious that the institutional structure of deposit insurance system coupled with prudential supervision and regulation (Demirguc-Kunt & Detragiache, 2002) exert an important function in mitigating moral hazard problem to ensure financial stability. If financial instability other than bank runs cause bank failures, then it cannot be concluded that deposit insurance system was unsuccessful. Bank failures could be due to many other external factors like bad economic environment, political instability, or non-credible design of the existing deposit insurance system and thus more prone to banking instabilities.

2.4 Summary

This chapter discusses the differences between explicit and implicit deposit insurance system. In addition, the four distinct design features of an explicit deposit insurance system are also described in detail.

Further, the purpose of this chapter has been to establish the academic literature on the impact of the introduction of a deposit insurance system in relation to bank risks, taking into account the principle-agent moral hazard problem. This chapter reveals the following research gap in the existing empirical literature. First, the findings from these studies remain inconclusive. Second, from the literature, the empirical studies sampling frame only includes conventional banks in the data analysis whereas the presence of Islamic banks in some of the countries has been excluded due to data limitation. Third, none of the current country specific studies have investigated the effectiveness or credibility of the risk-

based deposit insurance premium i.e. whether the risk-premium sensitivity significantly improves in the risk-based premium assessment method as the countries studied still continue to adopt the flat rate premium.

Fourth, to the best of the researcher's knowledge, no recent study has estimated the annual deposit insurance premium and investigated whether the magnitude of the annual premium paid is positively associated with bank risk. In spite of this, some authors like Demirguc-Kunt and Huizinga (2004) have investigated the relationship between bank risk and the risk premium assessment method using a dummy variable (flat rate versus risk-based premium). This thesis estimates the annual insurance premium paid by individual banks each year to describe the magnitude of the premium paid and its relationship with bank risk in a deposit insurance system. Fifth, there is limited evidence that operational risk increased after the implementation of an explicit deposit insurance system in conventional as well as the Islamic banking system. Finally, only very few previous studies have analyzed the implications of moral hazard on deposit insurance on bank level data. Therefore, this study attempts to deal with these issues in depth.

Chapter 3 considers the methodological issues applicable to the design of the research and sets out the approach.

Chapter 3 : Hypotheses and Research Design

3.0 Introduction

The purpose of this current chapter is to examine methodological issues that affect the design of the study that lays out the research design framework for data collection and analysis. The chapter is structured as follows:- Section 3.1 outlines the hypotheses and research design for the first part of this study that addresses the first two research questions. Section 3.2 specifies the hypotheses and research design for the second part of this study that estimates the explanatory variable to be used in answering the final research question. The design of the research framework is formulated by discussing the research approach, sample and data selection and measurement of key variables. In Section 3.1.1 and 3.2.1, the hypotheses are developed based on the literature review. Section 3.1.3 and Section 3.2.3 describe the two research methodologies adopted in this thesis. Finally, Section 3.3 provides the conclusion and summary.

3.1 Part 1: Deposit Insurance and Bank Risk in a Dual Banking System

This thesis investigates the implications of deposit insurance for both the conventional and Islamic banks. Despite the increasing popularity of Islamic banking, studies undertaken on Islamic banking are still scarce. According to the International Association of Deposit Insurance 2010 survey, only ten countries, including Malaysia have set up an Islamic deposit insurance system. Table 3.1 shows the list of Islamic banking system with Islamic Deposit Insurance.

Table 3.1: List of Islamic Banking System with Islamic Deposit Insurance

Country	Organization & Implementation Date	Country	Organization & Implementation Date
1.Indonesia	Indonesia Deposit Insurance Corporation (*22 Sept 2005*)	6.Bahrain	Central Bank of Bahrain (*1993*)
2.Malaysia	Malaysia Deposit Insurance Corporation (*1 Sept 2005*)	7.Jordan	Jordan Deposit Insurance Corporation (*2000*)
3.Turkey	Savings Deposit Insurance Fund (*December 2005*)	8.Bosnia	Deposit Insurance Agency (*2002*)
4.Singapore	Singapore Deposit Insurance Corporation (*April 2006*)	9.Kuwait	Central Bank of Kuwait (*2008*)
5.United Kingdom	Financial Services Compensation Scheme (*2001*)	10.Sudan[18]	Bank Deposit Security Fund (*1996*)

Source: International Association of Deposit Insurers website as at December 2012

However, among the above mentioned 10 countries, only Malaysia administered the Islamic deposit funds separately, operated by a government owned deposit insurer and regulated under a specific legislation. Malaysia, Indonesia and Turkey implemented their Islamic deposit insurance system in 2005 (Table 3.1). Table 3.2 shows a comparison of the number of Islamic banks operating in a dual banking system in Malaysia, Indonesia and Turkey. It is very apparent from this table that Malaysia has the most number of Islamic banks operating in a dual banking system. Coincidentally, financial data are available and accessible for the Islamic banks in Malaysia unlike in Indonesia and Turkey. Hence, Malaysia is an ideal sample to be used in this thesis to achieve its research objectives.

Another important empirical question in addressing the bank risk is extending the risk analysis to include operational risk. Operational risk is not a new risk. However, the operational risk profile is becoming more complex, given the deregulation and

[18] Sudan operates a full fledge Islamic banking system.

globalization of financial services, as well as the growing sophistication of financial technology, new business activities and delivery channels (Moosa, 2007). It is evident that a bank's ability to properly assess and control, or even hedge itself against the negative economic consequences caused by operational risks is less developed than its management of credit and market risks (Flores, Bonson-Ponte, & Escobar-Rodriguez, 2006). Major operational losses caused by internal or external fraud are a common cause of bank failures. For instance, fraud accounted for eight of the eleven bank failures in 2002 (Powell, 2003).

Added to that, Islamic banks face an unique mix of risks and risk sharing arrangement resulting from the contractual design of the financial instruments, which is based on the principle of *Shariah*. Errico and Farahbakhsh (1998) highlighted the importance of prudential regulation and supervision that includes greater emphasis on effective operational risk management. Islamic banks are perceived to have higher operational risk exposures, as the operational risk definition by the Islamic Financial Services Board also includes the non-compliance of *Shariah* principle risk. *Shariah* non-compliance risk is unique and significant in Islamic banks as it could lead to a loss of confidence in the bank by depositors, resulting in instability of the whole banking system (Tiby, 2011).

Table 3.2: List of Islamic Banks in Countries that Implemented Islamic Deposit Insurance in 2005

Country	**Organization & Implementation Date**	**List of Islamic Banks in Bankscope**		
1.Indonesia	Indonesia Deposit Insurance Corporation (22 Sept 2005)	1. PT Bank BRI Syariah 2. PT Bank, Muamalat Indonesia Tbk	3.PT Bank Syariah Bukopin 4. PT Bank Syariah Mandiri	5. PT Bank Syariah Mega Indonesia
2.Malaysia	Malaysia Deposit Insurance Corporation (1 Sept 2005)	1. Affin Islamic Bank 2. Alliance Islamic Bank 3.AM Islamic Bank 4. Bank Islam (M) Bhd 5. Bank Muamalat 6. CIMB-Islamic 7. EONCap Islamic 8. Hong Leong Islamic 9. Maybank Islamic	10. Public Islamic 11. RHB Islamic 12. Al-Rajhi Bank 13. Asian Finance Bank 14. HSBC Amanah 15. Kuwait Finance House 16. OCBC Islamic	17. Standard Chartered Islamic 18. Citibank (Islamic window) 19. Deutsche Bank (Islamic window)
#In terms of Islamic banking asset globally, Malaysian Islamic banks ranks higher in the world than its peers in Indonesia, Singapore, Turkey & the UK (Bankscope).				
3.Turkey	Savings Deposit Insurance Fund (December 2005)	1.Asya Katilim Bankasi AS-Bank Asya 2. Turkiye Finans Katilim Bankasi AS	3. Kuveyt Turk Katilim Bankasi A.S.-Kuwait Turkish Participation Bank Inc	4. Albaraka Turk Participation Bank-Albaraka Turk Katilim Bankasi AS)

Source: Derived by author from several sources

3.1.1 Hypotheses Development

Financial risk refers to risk other than operational risk. However, in this thesis, financial risk is confined to credit risk and insolvency risk. Post deposit insurance could have an increasing or decreasing effect on the banks financial risk taking. An increasing effect would signify the presence of moral hazard problem that could alters the riskiness of the

conventional banks (see for example Kansas, Wheelock & Wilson, 1995; Demirguc-Kunt & Huizinga, 2004; Ioannidou & Penas, 2010). A decreasing effect on financial risk taking could be due to credible design features of deposit insurance (Gropp & Vesala, 2004; Karels & McClatchey, 1999) coupled with prudential regulatory and supervisory measures (Cull, Senbet, & Sorge, 2005; Angkinand, 2009) that limit the banks' appetite for excessive risk taking after the introduction of deposit insurance. Contrary to previous empirical research, this study is unique as the banks in the sample include both the conventional and Islamic banks. This study investigates the relationship between deposit insurance and banks risks in both the conventional and Islamic banks.

As the majority evidence indicate that banks are inclined to take on more risk after the introduction of deposit insurance system, this study proposes the following testable hypothesis:

Hypothesis 1: Bank risk in the form of financial risk increases after the introduction of a deposit insurance system.

Most studies on bank financial risk taking, as highlighted in the literature on deposit insurance, have found significant positive evidence on the relationship between bank risks and deposit insurance (e.g. Forssbaeck, 2011; DeLong & Saunders, 2011; Ioannidou & Penas, 2010) but not specifically on operational risks. Chernykh and Cole (2011) examined the relationship between deposit insurance and operational risks in conventional banks. They found that operational risk taking increased after implementation of deposit insurance system, though the evidence was limited. Empirical research on operational risk is a new area. Hitherto literature on empirical research is scarce (Chernobai, Jorion, & Yu,

2011). By definition[19], operational risk includes the risk of losses from inadequate or failed internal process, people, system and external events.

As mentioned, the introduction of a deposit insurance system could lead to an increase in the banks' operational risk taking. An increasing effect would indicate that the moral hazard problem exists in the case of operational risk taking. As people and technology are fundamental in operational risk, the banks are exposed to operational risk even before commencement of any banking transaction. Frauds are reported to be one of the main factors that causes severe operational risk loss (Cope, Piche, & Walter, 2012). Banks rely on technology, that is supported by people and which has created growth opportunities for the banks'. In the presence of deposit insurance, banks are inclined to be more aggressive in expanding their business through new channels, such as agent banking and mobile banking, apart from existing channels such as internet banking and automated teller machine. However, this technology-based channel is a potential operational risk concern, in the form of fraudulent act (security threat) in the online banking space, that could disrupt the banking business operations. Hence, the following hypothesis is proposed:

Hypothesis 2: Bank risk in the form of operational risk increases after the introduction of a deposit insurance system.

This study predicts a difference in the outcome between the conventional and Islamic banks risk taking ventures, either in financial risk or operational risk, following the implementation of deposit insurance. The Islamic bank financing is based on a partnership relationship unlike the conventional banks' lender and borrower relationship. As a result, the Islamic banks share risks with their depositors instead of just lending out these deposits.

[19] As defined by the Basel Committee on Banking Supervision.

Although loss (other than the Islamic banks' negligence) arising from the lending or investment activity is borne by the capital owner (depositor), the Islamic banks still appear to be less risky than the conventional banks due to the *Shariah* compliance features in the financing contract (Cihak & Hess, 2008). This makes the Islamic banking industry a more viable and competitive alternative to the conventional banks in the global market (Khan & Bhatti, 2008). The article by Abdelaziz Chase and Lateef A.M. Syed (2010) on the resilience of Islamic financial institutions during the global financial crisis covers aspects of Islamic banks' risk management to address the crisis. Their paper suggests that the Islamic banks operation, that is subjected to compliance of Islamic finance principle, has enabled the Islamic banks to be more resilient than their conventional counterparts during the global financial crisis.

However, if there is an increase effect on financial risk in the Islamic bank risk taking after the implementation of deposit insurance it would signify that the presence of deposit insurance also bring about similar problem of moral hazard in the Islamic banks as in the conventional banks. Inadvertently, the *Shariah* principles might not be able to limit the incentives for excessive financial risk taking on the Islamic banks. With the introduction of deposit insurance, Islamic banks take the extra cushion provided under the guarantee to improve their profitability by extending more loans but with less stringent credit assessment. For example, loans extended without sufficient collateral and the rise in personal financing which is normally unsecured loans.

Similarly, an increasing effect on operational risk taking by the conventional and Islamic banks post deposit insurance would signify that the banks place greater emphasis on enhancing their profitability with greater reliance on technology, and this amongst others is a tradeoff to higher exposure to operational risk. Specifically, an increasing effect on

operational risk in the Islamic banks indicates that the source of operational risk from people, systems and processes could be acute in the Islamic banks as Islamic banks are relatively new in comparison to the conventional banks. As an emerging industry, Islamic banking is less understood than conventional banking. It might not have the appropriate qualified professionals who are fully conversant with Islamic finance principles (El-Hawary, Grais, & Iqbal, 2007) to conduct Islamic banking operations. These professionals might not operate according to *Shariah* compliance and could present an operational risk to the Islamic banks. Likewise, greater reliance on technology and computer software, developed for conventional banks, might not be appropriate for the Islamic banks as the nature of their business differs (Khan & Ahmed, 2001).

The effects of deposit insurance on financial risk and operational risk in the Islamic banks are yet to be tested. Islamic banks face unique mix of risks and risk sharing arrangement, arising from the contractual design of the financial instruments, which is based on the principles of *Shariah*. The theoretical underpinning of Islamic banks' differs from the conventional bank particularly the prohibition of *gharar* (uncertainty) and compliance with the *Shariah* principles in the financing contract that constraint the Islamic banks from embarking on higher risk taking although there are incentives to do so.

In contrast, the conventional banks do not operate under similar *Shariah* constraints. The profit and loss sharing as a basic principle in Islamic banking is not applicable under the conventional banking. Hence, the conventional banks' greed and appetite for a higher return that is attached to higher risk taking is not limited (Kayed & Hassan, 2009). The global financial crisis testifies that Islamic banks are more prudent i.e. taking less risk in comparison to their conventional counterparts. Moreover, the Islamic banks are less severely affected by the financial crisis due to their *Shariah* compliance constraints (Al-

Hamzani M, 2008). For instance, Islamic banks distance their business activities from mortgage back debt securities like the subprime mortgages due to the prohibition of interest and speculation activities. Further, the prohibition of *gharar* (uncertainty) constraints Islamic banks from being involved in high uncertainty investment projects.

However, there is very little empirical evidence to support these arguments in the literature concerning deposit insurance, on Islamic banks. Generally as reported by Abdelaziz Chazi and Lateef A.M. Syed (2010), Islamic banks risk as measured by capital adequacy is lower than the conventional banks. Abedifar, Molyneux and Tarazi (2011) also mentioned that Islamic banks exhibit lower credit risk than the conventional banks. Hence, there should be no increase in bank risk taking either in terms of financial risk or operational risk, in the Islamic banks as it is evident that compliance with the *Shariah* principles in fact prevents them from taking excessive risks. The experience of Malaysia, where Islamic banks and conventional banks have been operating alongside each other, might provide more insights when studying this relationship.

Therefore, Islamic banks might react differently from conventional banks to the introduction of deposit insurance system. Hence, the following hypotheses are tested:

Hypothesis 3: Bank risk in the form of financial risk increases in the conventional banks after the introduction of a deposit insurance system.

Hypothesis 4: Bank risk in the form of operational risk increases in the conventional banks after the introduction of a deposit insurance system.

Hypothesis 5: Bank risk in the form of financial risk increases in the Islamic banks after the introduction of a deposit insurance system.

Hypothesis 6: Bank risk in the form of operational risk increases in the Islamic banks after the introduction of a deposit insurance system.

3.1.2 Data

The sample includes 22 conventional banks both local as well as foreign owned banks incorporated in Malaysia and 18 Islamic banks both local and foreign owned which are mandatory members' bank under the explicit deposit insurance system administered by MDIC as shown in Table 3.3. The study period is from 2002-2010. Specifically this thesis uses the panel data to observe the changes to the repeated observation of the banks over the nine-year period (2002-2010) to investigate the moral hazard implication of the deposit insurance protection in the Malaysian dual banking system. The panel data sets are constructed using balance sheet and income statement from audited year-end financial statement for each individual bank.

For each bank, there should be at least three years of data. The period under study is from 2002 until 2010.[20] This study period is selected because from 2002 onwards the Malaysian conventional banks have undergone significant consolidation through mergers and acquisitions. In addition, data prior to 2002 is often missing and therefore obtaining data for the earlier years is not feasible.[21] The five deposit taking institutions namely the development financial institutions that are not mandatory members of the deposit insurance protection system are excluded from the sample. As state-owned banks, these DFIs[22] have

[20] From 2011 onwards the coverage limit has been increased to RM250,000 from the RM60,000 covered in 2006-2010.
[21] Most of the missing data from Bankscope is complemented by the data in annual report of individual bank sourced from either the bank's website or the Bank Negara Malaysia Knowledge Management Centre (KMC). Where the data is not available in the bank's website or KMC, attempts have been made to contact the bank requesting for the missing data. However, almost all the banks contacted did not respond to our request for the missing data.
[22] The DFIs are also excluded from the sample as these banks are not required to report their risk weighted asset and risk weighted capital ratio and are regulated by the central bank under a different act (Development Financial Institutions Act 2002).

some form of implicit guarantee by the government on the deposits even before the introduction of deposit insurance system in Malaysia. Other more specialized institutions, like investment banks are also not included in the sample.

This thesis uses secondary data to gather information pertaining to the research topic. The data were collected personally from the banks' financial statements as of calendar year-end, from either the Bankscope[23] or individual bank's annual reports. The major data source is from the annual reports of individual banks, particularly the Islamic banks, as banks that operate Islamic banking window report their Islamic banking operations under the Income Statement notes to the account. The breakdown of the Islamic banking activity is only reported in the notes to the account in the respective bank's individual annual report. The study uses the bank unconsolidated statements if available.

[23] Bankscope is a database of bank account figures by Bureau Van Djik, a publisher of financial database.

Table 3.3: Sample Banks

Conventional Banks		
Local banks (9 banks)	**Foreign banks (13 banks)**	
1. Affin Bank Bhd	1.Bangkok Bank Bhd	8.J.P Morgan Chase Bank Bhd
2. Alliance Bank Bhd	2.Bank of America (M) Bhd	9.OCBC Bank (M) Bhd
3. AmBank (M) Bhd	3.Bank of China (M) Bhd	10.Standard Chartered Bank Malaysia Bhd
4. CIMB Bank Bhd	4.Bank of Tokyo Mitsubishi-UFJ (M) Bhd	11.The Bank of Nova Scotia Bhd
5.Eon Bank Bhd	5.Citibank Bhd	12. The Royal Bank of Scotland Bhd
6. Hong Leong Bank Bhd	6.Deutsche Bank (M) Bhd	13.United Overseas Bank (M) Bhd
7. Malayan Banking Bhd	7.HSBC Bank Malaysia Bhd	
8. Public Bank Bhd		
9. RHB Bank Bhd		
Islamic Banks		
Local banks (11 banks)		**Foreign banks (7 banks)**
1.Affin Islamic Bank Bhd	7.EONCAP Islamic Bank Bhd	1.Al-Rajhi Banking & Investment Corp (M) Bhd
2.Aliance Islamic Bank Bhd	8. Hong Leong Islamic Bank Bhd	2.Asian Finance Bank Bhd
3.AmIslamic Bank Bhd	9.Maybank Islamic Bhd	3.HSBC Amanah Malaysia Bhd
4.Bank Islam Malaysia Bhd	10.Public Islamic Bank Bhd	4. Kuwait Finance House (M) Bhd
5.Bank Muamalat Malaysia Bhd	11.RHB Islamic Bank Bhd	5.OCBC Al-Amin Bank Bhd
6.CIMB Islamic Bank Bhd		6.Standard Chartered Saadiq Bhd
		7.Citibank (Islamic window)

The sample for the conventional banks is a balanced panel while the panel is unbalanced for the Islamic banks sample. Table 3.3 lists the name of banks included in the sample. The final sample is an unbalanced panel[24] where different numbers of bank-year observations are used in each regression, depending on the availability of data for the variables included in that regression. The total number of banks included in this study is

[24] The conventional bank sample is a balance panel. On the contrary, the panel is unbalance for the Islamic banks as new foreign Islamic banks especially from the Middle East started their business operations in Malaysia only from 2005 onwards.

forty banks[25] over a nine-year period. However, as this thesis employs the dynamic panel model, several observations had to be dropped from the total number of observations available due to the first differencing of the variables and lagged values of instruments for the endogenous variables in a GMM framework.

3.1.3 Methodology - A Dynamic Panel Regression

In the literature on deposit insurance, two studies namely, Chernykh and Cole (2011) and Hadad et al. (2011) employ the random effect estimator and the Generalized Method of Moment (GMM) estimator, respectively.

A panel regression could minimize the biased estimations resulting from aggregating individual units into a broad one. Essentially, there are three main advantages of panel regression summarized by Gujarati (2003) as follows:

i. The combination of time series and cross section observations could provide more information, variability, degree of freedom with less collinearity among intercept dummy variables;

ii. The relationship in a panel regression is examined by repeating the cross sectional observation, thereby providing better link to study the dynamic change or adjustment; and

iii. Panel regression could obtain or detect some association that could not be found in either pure time-series or cross sectional regression.

[25] Three foreign conventional banks namely the Industrial and Conventional Bank of China (Malaysia) Berhad, Mizuho Corporate Bank (Malaysia) Berhad and Sumitomo Mitsui Banking Corporation Malaysia Berhad are excluded from this thesis sample as they do not meet the sample selection conditions in paragraph 2 of Section 3.1.2.

A panel regression could be divided into two structures, that is static panel and dynamic panel. Depending on the rule, one could estimate the coefficients in the model based upon Random Effect (RE) estimator and Fixed Effect (FE) estimator under the static panel and the GMM and Seemingly Unrelated Regressor (SUR) under the dynamic panel (Baltagi, 2005). This thesis does not employ SUR because the panel data in this thesis is short. SUR is based on a larger number of periods; T that approaches infinity than the number of groups (Baltagi, 2005). The FE is the preferred estimator as the RE can be an invalid or inconsistent estimator when some of the regressors are associated with the unobserved heterogeneity effect. Notwithstanding this, the FE estimator is unable to compute the time invariant coefficients like ownership and banking system inbuilt in the model of this thesis.

Although the FE model could be corrected to estimate the time-invariant variables in the Hausman-Taylor Instrumental Variable model, it doesn't solve the correlation problem with the unobserved heterogeneity effect. This is because the instrumental variables are selected from the explanatory variables in the model that might still cause the endogeneity problem. The instrumental variables are in fact the lagged variables among the regressors in the GMM model. It is unlikely that this lagged variable would be correlated with the unobserved heterogeneity effect, so the dynamic panel solves the endogeneity problem. As a result, this thesis opts for the dynamic panel instead of the static panel as it is more unbiased, precise and an efficient estimator, particularly in solving the endogeneity problem in a panel data model. Precisely, this thesis employs the System Generalized Method of Moments (GMM) estimator of Blundell and Bond (1998).[26]

[26] The system GMM estimator handles important modeling concern like the fixed effects, endogeneity of regressors and avoiding dynamic panel bias (Baum, 2006). I employ the system GMM because system GMM handles my modeling concern in relation to fixed effect. The static panel particularly the Fixed Effect estimator is unable unable to compute this fixed effect ie. the time invariant coefficients like ownership and banking system inbuilt in the model of this thesis. On the other hand, System GMM (specifically two-step system GMM) allows the estimation of the time-invariant coefficients. Although the system eliminates the time invariant variables, the time-invariant variable coefficient is estimate in first difference.

Arellano and Bond (1991) originated the standard GMM estimator, also known as first-differenced GMM. They applied the difference of each variable for both the dependent and explanatory variables in the regressions and introduced instrument variables from the lagged levels of the regressors. However, the lagged levels of the regressors could be a poor instrument if there is serial correlation in the errors. In this case, first-difference GMM might result in imprecise or even biased estimators.

To overcome these shortcomings discussed above, the System GMM was introduced by Arellano and Bover (1995) and Blundell and Bond (1998).[27] The System GMM generates efficient estimators of the dynamic model particularly when the time period is smaller than the number of groups. The System GMM comprises two types of simultaneous equations, whereby one equation is in lagged difference of the dependent variable as instruments for equation in levels and lagged levels of dependent variables as instruments for equation in first difference. Concerning time-invariant variables, the system eliminates the effect of time-invariant variables in first difference but estimates in levels.

Blundell and Bond (1998) demonstrate in their paper that the System GMM has smaller variances and is more efficient, thereby improving the precision in the estimator. Furthermore, it adjusts the biases of the time-invariant estimates while the momentary condition ensures no correlation between the unobservable effect/time-invariant effect/ instrument variables particularly when the time period is small. All in all, the dynamic panel addresses potential problems of endogeneity, heteroscedasticity and autocorrelation in the data.

[27] They develop the System GMM framework to look for an efficient instrumental variable for dynamic panel data models.

Baltagi (2005) points up that the presence of a lagged dependent variable is a unique characteristic of a dynamic panel model. This thesis model follows a one-way error component model and is written in the model as follows:

$$Y_{i,t} \equiv \alpha Y_{i,t-1} + X'_{i,t}\beta + u_{i,t} \quad (3.1)$$

$$u_{i,t} = \mu_{i,t} + v_{i,t} \quad (3.2)$$

Where:

$Y_{i,t}$ - level of bank risk of bank *i* in period *t*

$Y_{i,t-1}$ - the lagged of the bank risk

α - a scalar

$X'_{i,t}$ - the explanatory variables of bank *i* in period *t*

$u_{i,t}$ - a random term which comprise two components

$\mu_{i,t}$ - the unobservable time-invariant individual or firm specific effects

$v_{i,t}$ - the remainder disturbance

Model 3.1 is first estimated by the ratio of non-performing loans over total asset (NPLTA) for our credit risk measure as the dependent variable. Then, the same model is re-estimated with the ZSCORE and the ratio of overhead expenses to total asset (OVERHEADTA) including five explanatory variables. Instead of introducing interaction terms (Greene, 2012) between the deposit insurance variable and the key explanatory variable; banking system (conventional versus Islamic banks), we undertake a conservative

approach by splitting[28] the conventional banks and Islamic banks into two samples. Hence, this thesis runs three separate samples that comprise the full sample, Islamic banks sample and conventional banks sample. Altogether there are three equations as below.

$$NPLTA_{i,t} = \beta_0 Y_{NPLTA\ it-1} + \beta_1 POSTDI_{i,t} + \beta_2 FOREIGN_{i,t} + \beta_3 RWCR_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 OVERHEADTA_{i,t} + \beta_6 BKGSYS_{i,t} + error_{i,t} \quad (3.3)$$

$$ZSCORE_{i,t} = \beta_0 Y_{ZSCORE\ it-1} + \beta_1 POSTDI_{i,t} + \beta_2 FOREIGN_{i,t} + \beta_3 RWCR_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 OVERHEADTA_{i,t} + \beta_6 BKGSYS_{i,t} + error_{i,t} \quad (3.4)$$

$$OVERHEADTA_{i,t} = \beta_0 Y_{OVERHEADTA\ it-1} + \beta_1 POSTDI_{i,t} + \beta_2 FOREIGN_{i,t} + \beta_3 RWCR_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 NPLTA_{i,t} + \beta_6 BKGSYS_{i,t} + error_{i,t} \quad (3.5)$$

Where:

$NPLTA_{i,t}$ = the ratio of non-performing loans to total asset of bank *i* at time *t*

$ZSCORE_{i,t}$ = the risk index of bank *i* at time *t*

$OVERHEADTA_{i,t}$ = the ratio of overhead expenses to total asset of bank *i* at time *t*

$Y_{BANK\ RISK\ it-1}$ = the lagged dependent variable (NPLTA, ZSCORE & OVERHEADTA) of bank *i* at time *t*

$POSTDI_{i,t}$ = a dummy variable: one for the year 2006-2010 (after the introduction of deposit insurance system); zero for the year 2002-2005 (before the introduction of deposit insurance system)

$FOREIGN_{i,t}$ = a dummy variable: one for foreign banks; zero for local banks

[28] The analysis is perform separately for conventional and Islamic banks to allow the researcher the opportunity to investigate how significantly different is the conventional and Islamic banks in their risk taking after the introduction of deposit insurance protection.

$RWCR_{i,t}$ = the risk weighted capital ratio of bank *i* at time *t*

$SIZE_{i,t}$ = the natural log of total assets of bank *i* at time *t*

$BKGSYS_{i,t}$ = a dummy variable: one for conventional banks; zero for Islamic banks

$error_{i,t}$ = is the error term

3.1.3.1 Dependent variables[29]

The focus of this thesis is to investigate the presence of moral hazard problem by way of increased bank risk taking after the introduction of a deposit insurance system.

In the literature, the commonly used risk measures are the accounting-based measures that include non-performing loans, ZSCORE and liquidity ratio. Some authors also use different measures of risk such as the abnormal return of publicly traded banks (DeLong & Saunders, 2011) and the credit quality of bank loans (Ioannidou & Penas, 2010). The market measures of risk are not taken into account in this study as the Islamic banks are listed under their holdings company unlike the conventional banks. Moreover, the study has to retain the richness of the Islamic banks' data. Hence, the first dependent variable for this thesis is the ratio of non-performing loans to asset; NPLTA (Maysami & Sakellariou, 2008; Gropp & Vesala, 2004; Karels & McClatchey, 1999). NPLTA is a proxy for credit risk and a high ratio in NPLTA indicates high risk.

[29] The explanatory variables are selected based on the current deposit insurance literature. The current literature presented in Section 2.5 covers past studies that not only include cross sectional studies for developed and developing countries but also country specific studies like US, Bolivia, Turkey, Indonesia and Russia. The variables are derived from annual reports which are mostly the accounting-based variables. The annual reports of the Malaysian firms not only meet the standard prescribed by the Malaysian Accounting Standard Board but also comply with the international standard prescribed by the International Accounting Standards Board of the IFRS.

Besides NPLTA, ZSCORE is the second variable for bank risk in this thesis. ZSCORE is a proxy for insolvency risk. It is a bank risk index developed by Hannan and Hanweck in 1988. This thesis calculates the ZSCORE by following Hadad et al. (2011) and Boyd et al. (2006) but with two years moving windows. ZSCORE is the sum return on average asset and return on equity, divided by the standard deviation of the return on asset.

The ZSCORE is calculated as follows:

$$ZSCORE_{i,t} = [ROA_{i,t} + EQTA_{i,t}] / StdROA \quad (3.6)$$

Where

$ROA_{i,t}$ = return on average asset for bank *i* at time *t*

$EQTA_{i,t}$ = equity capital to asset ratio for bank *i* at time *t*

StdROA = the standard deviation of ROA

In Equation (3.6), return on average asset is equal to net income divided by average total assets. The total assets are averaged using the arithmetic mean of the value at the end of the year *t* and *t-1*. Given that StdROA for each bank is computed over the observed time period, the ZSCORE value in this thesis is measured based on a time series approach.

The ZSCORE is an index that incorporates three standard elements of bank risk namely the ROA, the standard deviation of ROA and equity capital. The standard deviation of ROA in the formula imparts the volatility of bank earnings. On the other hand, the bank performance is provided by the ROA itself. The equity capital defines the available capital that a bank has to absorb unexpected losses. To a degree, ZSCORE measures how much the earnings could decline until the bank has a negative book value and become insolvent

(Nash and Sinkey, 1997). A higher ZSCORE implies a safer bank whereas a low ZSCORE implies a riskier bank.

The final dependent variable for this thesis is operational risk. In the literature concerning operational risk, the loss data is used to measure operational risk. However, in circumstances where the operational loss data are unavailable, operational risk is measured using the accounting-based ratio. Previous studies measure operational risk as bank loan to assets ratio and equity to asset ratio (Demirguc-Kunt & Huizinga, 2004; Chernykh & Cole, 2011; Lei & Tzu-Pu; 2011). Operational risk differs from financial risk (e.g. credit risk and insolvency risk) as it relates to how the bank management and staff operate, that is even prior to financing being made available to borrowers (Moosa I. A., 2007).

Operational risks reflect the ethos prevalent among bank employees that could lead to deceit practices. It propagates an environment where the various types of operational risk as outlined in Basel II, such as internal and external fraud, defective employment practices and security at workplace, unsuccessful ventures related to clients, products and business practices, destruction of physical assets, interruption to business and system breakdowns and implementation issue arise (Chernobai, Jorion, & Yu, 2011). Hence, this thesis introduces management efficiency measured by the ratio of overhead expenses to total asset; OVERHEADTA as an alternative measure for operational risk. As operational risk underpins managers' responses, the OVERHEADTA ratio is more appropriate in measuring operational risk. A high ratio of OVERHEADTA might indicate management deficiencies or inefficiency.

3.1.3.2 Explanatory Variable

The explanatory variable in Equation (3.3) until (3.5) are defined as follows:

Deposit Insurance Period

A dummy variable that takes the value zero if the observation is from 2002-2005 (before the introduction of deposit insurance system) and one if the observation is from 2006-2010 (after the introduction of deposit insurance system). This is similar to that adopted in the current literature, for example Chernykh and Cole (2011) and Ioannidou and Penas (2010).

3.1.3.3 Control Variables

In investigating the relationship between risk and an explanatory variable, six other variables based on literature, that might have an impact on bank risk taking have to be taken into account. These are controlled for in this thesis through Equation (3.3) until (3.5).

Ownership

Normally, foreign banks look at possible risk exposure in the initial stage of their product financial innovation by employing technology that is more sophisticated. In addition, foreign banks would employ more sophisticated risk management tools and a better internal control system. Thus, the foreign banks have fewer incentives to increase their risk taking behavior in the presence of deposit insurance protection. In addition, foreign banks have the capacity to diversify their asset portfolio across countries. Therefore, this thesis has put in place control for bank ownership by differentiating the two types of ownership, such as

foreign and local banks present in the Malaysian banking system. A dummy variable takes the value one if the bank is a foreign bank and zero if it is a local bank.

Banking System

As Malaysia is operating a dual banking system, this thesis controls for the banks' license type through Equation (3.3) till (3.5) for the full banks sample. The banking system is divided into the conventional banking system and Islamic banking system. All the conventional banks and Islamic banks are regulated by the Banking and Financial Institution Act (1989) and the Islamic Banking Act (1983) respectively. A dummy variable takes the value of one for conventional banks and zero for Islamic banks.

Bank Size

A larger bank has a greater potential to diversify its asset risk. Alternatively, the larger a banking firm, the lower the information asymmetry that could lead to adverse decision making in their business and investment activities. Larger banks have more information that they could obtain either in-house or from external financial analysts. Moreover, depositors believe that regulators are unwilling to let larger banks (too big to fail banks) to fail, where implicit guarantees arise in the absence of the formal deposit insurance system. The failure of the "too big to fail banks" could trigger a contagion in the financial system. Hence, asset size is used to control for other factors that might affect the level of bank risk. If too-big-to-fail guarantees are present in the Malaysian banking system, one would expect very large banks to take more risks than smaller banks.

Regulatory variables: **Risk Weighted Capital Adequacy Ratio (RWCR)**

Capital is the primary cushion against adverse changes in the bank's asset quality and earnings. RWCR is controlled in this thesis equation to provide different levels of riskiness among the banks due to regulatory constraints. A rise in RWCR indicates that banks are decreasing their assets or increasing their capital which would have a positive effect on bank operations as banks have sufficient buffer to handle unexpected adverse shock. When banks reduce lending, leverage falls as assets are comprised mostly of loans. Thus, regulatory pressure could prevent the banks from taking high risks following the introduction of deposit insurance.

Risk Variables

The inclusion of the risk variables NPLTA and OVERHEADTA are to control the bank's risk taking behavior. The thesis incorporates the credit risk measures; NPLTA as one of the control variables to redress the impact of deposit insurance on operational risk while OVERHEADTA is controlled in the estimates for credit risk and insolvency risk (financial risk).

General Macroeconomic Conditions

As in other studies, this thesis incorporates elements to check macroeconomic situation. Earlier studies such as Mannasoo and Mayes (2009) and Bonfim (2009) have shown that adverse macroeconomic conditions normally herald bank failures. Further, the present world predicament calls for a good grasp of the potential consequences of adverse macroeconomic conditions on the buoyancy of the banking system. Chernykh and Cole (2011) applied year dummy variables to control for overall macroeconomic situations. On

the other hand, Ioannidou and Penas (2010) used among others the Gross Domestic Product growth rate and the inflation rate to control for general macroeconomic conditions.

Since macroeconomic factors are common factors that affect all the banks in a certain period, though they vary from period to period, their effects could be captured simply by including time-specific effects in the regression. The time dummies is a collection of dummy variables; (n=T-1) where T is the number of years included in the study which are equal to 1 for one given year and zero otherwise. The inclusion of time fixed effects is one way of capturing the effect of unobservable common factors that vary with time but are constant for all banks. As there are nine years in the sample period, the research would have eight time dummies. Similar to Chernykh and Cole (2011), this study uses year dummy variables to control for general macroeconomics conditions such as inflation, household income, economic growth etc. and seasonal effects apart from the presence of explicit deposit insurance itself.

3.2 Part 2: Risk-Premium Sensitivity and Bank Risk

Literature for cross sectional study suggests that the risk-based premium method would mitigate the moral hazard problem (see for example Hovakimian et al., 2003; Cull, Senbet, & Sorge, 2005; Demirguc-Kunt & Detragiache, 2002; Demirguc-Kunt & Huizinga, 2004). However, none of the current country specific empirical studies in the deposit insurance literature have thus far examined the sensitivity of the deposit insurance premium with bank risks in a risk-based assessment method as these country specific studies (for example, Russia, Bolivia and Indonesia) adopted the flat rate insurance premium.

In Malaysia, the flat-rate premium of 0.06% was imposed during the initial stage of implementation of deposit insurance, that is from 2006 until 2007. Thereafter, the risk-based premium system was introduced in 2008 and continues to be in place until today. Under a risk-based premium, each member banks' annual premium is calculated differently based on the prescribed premium rate according to their individual risk categories.

3.2.1 Hypotheses Development

This part of the thesis examines the sensitivity of deposit insurance premium towards bank risks in the risk-based premium assessment method in mitigating the moral hazard problem. A positive relationship between the risk-based premium and bank risks illustrates that the risk-premium sensitivity improves in the risk-based premium assessment method. Under the risk-based premium assessment method, banks that fall under the high-risk category pay a higher premium rate than those in the low risk category. Hence, this would encourage the former to improve its risk management practices.

On the other hand, this thesis would also explain whether the magnitude of annual premium paid by banks is positively associated with bank risks. The annual premium paid is calculated based on the prescribed risk-premium rate and total insured deposits. If the risk-based deposit insurance premium is positively associated with bank risk, then the government risk-based deposit insurance policy would effectively mitigate the moral hazard problem. At the same time, banks are subject to a minimum annual premium of RM250,000. In relation to this, if the actual premium estimated under the risk-based premium is lower than the stipulated amount, the banks would still have to pay a minimum mandatory premium of RM250,000. Therefore, the annual premium paid by banks does

not necessarily reflect the riskiness of banks. These arguments underlie the following testable hypothesis:

H7: The risk-premium sensitivity significantly improves in the risk-based premium assessment method.

H8: The magnitude of the annual premium paid is positively associated with the bank risk.

3.2.2 Data 1: Estimation of Annual Insurance Premium

Under this section, data are collected to estimate the annual premium paid. Malaysian Deposit Insurer Corporation's (MDIC's) methodology is employed to estimate the annual premium as it allows for computation of the premium paid by conventional banks and Islamic banks. Table 3.4 lists down the data requirement for the formula as laid out in Section 3.2.3. All the data for the period 2006-2010 were obtained directly from various issues of the annual reports for all the 22 conventional and 18 Islamic banks that are available on the banks' websites or at Bank Negara Malaysia Knowledge Management Centre. In determining the selection of data and estimation of the annual premium, experts from MDIC were consulted. These experts verified that the annual premium estimated is relatively consistent with the actual figures.

The estimated annual premium, including the estimated value for the five quantitative criteria in Table 3.4 and the total insured deposits value under Section 3.2.3.2.2 are deemed as sensitive information. A confidentiality agreement was signed between MDIC and the thesis author. Amongst others, the author is prohibited from disclosing any data pertaining to the estimation of the banks' annual insurance premium to any third party.

Table 3.4: Summary of Criteria and Data Requirement

Criteria	**Data Requirement**
Prescribed Premium Rate	
Capital	1. Risk weighted capital ratio
	2. Core capital ratio
Profitability	
For conventional banks	1. Profit before tax
	2. Total risk weighted assets
For Islamic banks	1. Profit before tax
	2. Profit equalization reserve (PER)
	3. PER written back
	4. Capital
	5. Specific investment deposit
	6. General investment deposit
	7. Total risk weighted assets
Asset Quality	
	1. Total impaired loans
	2. Total individual impairment provisions
	3. Capital base
	4. Gross loans
Asset Concentration	
	1. Loans to household sector
	2. Total loans outstanding
Asset Growth	
	1. Total risk-weighted assets
	2. Risk weighted assets for operational risk
	3. Total assets
	4. Credit equivalent of off-balance sheet items
Total Insured Deposits	
Deposits from Customers	1.Government & Statutory Bodies
	2.Business Enterprise
	3.Individuals
	4.Others

3.2.3 Methodology 1: Estimation of Annual Premium Paid

The International Association of Deposit Insurer (IADI) issued a General Guidance for Developing Differential Premium Systems in February 2005 (updated October 2011) as a reference for countries considering the adoption of a risk-based insurance premium system. Although a flat-rate premium is easily calculated and administered, the flat rate premium does not capture the bank's risk profile in the computation of the premium paid by the banks. Moreover, the flat rate premium is perceived as unfair as the same premium rate is charged to all banks regardless of their level of risk. As a result, many countries are contemplating to shift from the flat rate premium to the risk-based premium. Nevertheless, the risk-based premium system requires resources to administer the system appropriately as measurement and pricing of risk is a complicated task. Further, sound accounting practices and financial reporting disclosure are essential.

The Federal Deposit Insurance Corporation (FDIC) introduced the first recorded risk-based premium system in 1993. Since then, the number of countries adopting a risk-based premium has grown with an estimated twenty-four countries. Based on the results of the Canada Deposit Insurance Corporation International Deposit Insurance Survey in 2003 and 2008 and IADI surveys, the countries shown in Table 3.5 had adopted the risk-based premium system.

Table 3.5: List of Countries Adopting the Risk-based Insurance Premium

Argentina	Italy	Nicaragua	Singapore
Canada	Kazakhstan	Nigeria	Sweden
Colombia	Malaysia	Peru	Taiwan
Finland	Marshal Island	Poland	Turkey
France	Micronesia	Portugal	United States
Germany	Netherlands	Romania	Uruguay

Source: International Association of Deposit Insurers website as at December 2012

There is no one universal approach to differentiate bank risk. However, the general methodologies comprise mainly the objective (quantitative) approach or subjective (qualitative) approach and a combination of both. For the quantitative approach, financial data are gathered to assess risk. Usually, one or a combination of quantitative factors is used to differentiate risk among banks. On the other hand, qualitative approach relies on regulatory and supervisory judgments or rating system and information. The qualitative assessment provides an indication, such as the current and future financial status of a bank and compliance with existing guidelines that is not captured by quantitative approach. Such information is only exclusively accessible by regulators, supervisors and the like. In comparison, the major advantage of using the quantitative approach is its transparency and it is less susceptible to arguments than a subjective approach. This thesis estimates the annual premium paid[30] by the banks using the quantitative approach with modifications based on MDIC guidelines[31] accessible from the website.

[30] I wish to thank the experts from the Malaysian Deposit Insurance Corporation (MDIC) for their excellent coaching in understanding the annual premium methodology. I signed the Confidentiality Agreement as required by the MDIC legal advisor. The Confidentiality Agreement is attached in the Appendix. By signing the Confidentiality Agreement, I am prohibited from disclosing any data pertaining to the estimation of the five quantitative criteria and total insured deposits in the thesis. The data for these five criteria is deemed as sensitive information.

[31] The banks annual premium is estimated by the author based on the Guidelines on Total Insured Deposits with maximum deposit coverage of RM60,000, Guidelines on the Differential Premium System and Guidelines for Deposit Insurance Coverage for Deposits issued by Malaysian Deposit Insurance Corporation. These Guidelines are retrievable at http://www.MDIC.gov.my/downloads/2012/gpcp/GL1_A1_2011_TID-ENG.pdf , http://www.MDIC.gov.my/downloads/2012/gpcp/GL2_A1_2011_DPS-ENG.pdf and http://www.MDIC.gov.my/downloads/2012/gpcp/GL10_2011_COV-ENG.pdf respectively.

3.2.3.1 Flat rate Premium

In the early years (2006-2007) of Malaysia's adoption of a deposit insurance system, the annual premium paid by the insured members' bank was based on a flat rate premium system. Under this system, the annual premium rate was calculated as either 0.06% of total insured deposits or 0.02% of total deposits, subject to a minimum premium of RM250,000 as required by the MDIC Act. This requirement applied to all insured members,' both conventional and Islamic banks. The flat rate premium was calculated based on the Equation (3.7) or (3.8).

Annual premium = Total insured deposits X 0.06% (3.7)

Total insured deposits are defined[32] as follows

(a) Islamic and conventional deposits placed with a member such as savings, demand and fixed deposits;

(b) Bank drafts, cheques or other instruments or payment instructions entered into a designated payment system under subsection 6(1) of the Payments System Act 2003; and

(c) Foreign currency deposits.

or

Annual premium = Total deposits X 0.02% (3.8)

[32] Definition is as per MDIC Guidelines on Total Insured Deposits: Calculation and Completion of Return dated 4th March 2011. Accessible at http://www.pidm.gov.my/downloads/2012/gpcp/gl_tid2011_ENG.pdf

For consistency, this thesis estimates the annual insurance premium based on Equation (3.7) for the 2006-2007 period under the flat rate insurance system.

3.2.3.2 Risk-based Premium

The objective of a risk-based premium is to provide incentives for the banks to avoid excessive risk taking and introduce more fairness into the premium assessment process. This is because the risk-based assessment warrants banks with a higher risk profile to pay higher premiums than the banks with lower risks. The risk-based premium provides for the segregation of the higher risk banks in a different category from the lower risk banks.

The risk-based premium replaced the flat-rate premium in 2008. In retrospective, this thesis adopted the risk based premium system methodology applying only the quantitative approach[33] based on MDIC Guidelines on The Differential Premium Systems issued on 4th March 2011.[34] The objectives of the Malaysian risk based premium includes (i) providing incentives for member institutions to adopt sound risk management practices; (ii) differentiating members' bank according to their risk profiles; (iii) introducing more fairness into the premium assessment process; and (iv) promoting financial stability.

In line with most countries, Malaysia also adopted a combined approach of both quantitative and qualitative measures to assess the risk of members' bank under the risk based premium. Similar to the Equation (3.7), the annual premium under the risk-based premium is calculated as the function of total insured deposit. However, the premium rate is no longer the flat 0.06% rate but is replaced with a prescribed differential premium rate

[33] Malaysia adopted a combination of quantitative and qualitative approaches in the risk-based premium system methodology. The previous MDIC guidelines issued on the risk-based premium system are based on data reported under Bank Negara Malaysia Financial Institutions Statistical System (BNM FISS) which has restricted accessibility to only Bank Negara Malaysia and respective banks.

[34] These guidelines supersede the Guidelines on the Differential Premium Systems issued in 2008 and Amendment to Section 6 of the Guidelines on the Differential Premium Systems issued in 2009.

based on the bank's risk profile. The premium rate is calculated based on the quantitative measures. Following this, the annual premium under the risk-based premium system is equated as follows:

Annual premium = Total insured deposits X Prescribed premium rate (3.9)

3.2.3.2.1 Prescribed Premium Rate Computation: Quantitative Criteria

In Equation (3.9), the prescribed annual premium rate is derived based on several factors under the quantitative and qualitative criteria, as summarized in Table 3.6.

Table 3.6: Summary of Criteria, Measures and Scores

CRITERIA	MAXIMUM SCORE	
QUANTITATIVE CRITERIA		60
Capital		**20**
Risk weighted capital ratio	10	
Core capital ratio	10	
Profitability		**15**
Return on risk weighted Asset Ratio	8	
Mean Adjusted Return Volatility	7	
Asset Quality		**15**
Net Impaired Loans to Capital Base Ratio	8	
Net Impaired Loans Ratio	7	
Asset Concentration		**5**
Household Sector Concentration Ratio; and Aggregate Sector Loans Concentration Ratio	5	
Asset Growth		**5**
Risk weighted Assets to Total Assets Ratio; and Total Asset Growth Ratio	5	
***QUALITATIVE CRITERIA**		40
Supervisory Rating	35	
Other Information	5	
TOTAL		**100**

*Excluded from this thesis computation due to data limitation. This thesis only employs the quantitative criteria.

The prescribe premium rate is estimated based on a scoring measure as shown in Table 3.7 below. The prescribed premium rate would classify members' bank into one of the four

premium categories based on their risk-based premium score with category 1 representing the lowest risk profile (best) and 4 representing the highest risk profiles (worst). The lowest premium rate is imposed for the best risk profile while the worst risk profile is charged the highest premium rate. A score of less than 50 out of 100 would be placed in the highest premium category (Category 4) while those with a score of 85 or higher would fall under the lowest premium category (Category 1).

Table 3.7: Premium Rate Under the Risk-based System

Premium Category (Column 1)	Score (Column 2)	Premium Rate (Column 3)
1	≥ 85	0.03%
2	≥ 65 but < 85	0.06%
3	≥ 50 but < 65	0.12%
4	< 50	0.24%

In Table 3.7, members' bank are assessed and classified into different premium categories in an assessment year based on the quantitative criteria. In this study the quantitative criteria are given a total score of 100.[35]

The quantitative criterion generally uses factual data or data from the financial statements for premium assessment. The quantitative measures used by the insured Malaysian banks consist of five factors namely the capital, profitability, asset quality, asset concentration and asset growth with each factor represented by two proxies. The detail calculation is demonstrated under subsection (i) to (v) below.

[35] In the MDIC Guidelines the risk-based premium is calculated based on a quantitative and qualitative criteria. The quantitative criteria is given a total score of 60 while a score of 40 is assigned to the qualitative criteria. The factors under the qualitative criteria are confidential with limited access to the central bank (BNM) and the deposit insurer (MDIC). Overall the Malaysian banking system is in a healthy state as there are no reported bank failures during the study period. Hence, there is unlikely to be a big difference in the rating amongst the banks. Therefore, the annual premium is estimated based on only the quantitative criteria.

i. Capital Factor

The capital factor is further divided into two proxies that is the risk weighted capital ratio (%) and a core capital ratio (%). The formula for the risk weighted capital ratio is as follows:

$$\left(\frac{\text{Capital Base}}{\text{Total Risk Weighted Assets}}\right) \times 100 \qquad (3.10)$$

Equation (3.10) would be used to calculate the risk weighted capital ratio. The ratio obtained would be matched against the scoring grid in Table 3.8 to determine the score for the members' bank. Table 3.8 outlines the scoring grid for the risk weighted capital ratio.

Table 3.8: Scoring Grid – Risk Weighted Capital Ratio (%)

Risk Weighted Capital Ratio	
Range of Results	Score
Risk Weighted Capital Ratio ≥ 12%	10
Risk Weighted Capital Ratio ≥ 11% but < 12%	8
Risk Weighted Capital Ratio ≥ 10% but < 11%	6
Risk Weighted Capital Ratio ≥ 9% but < 10%	4
Risk Weighted Capital Ratio ≥ 8% but < 9%	2
Risk Weighted Capital Ratio < 8%	0

A risk weighted capital ratio of 12% and higher earns the full score of 10 while those banks with a score of below 8% do not get any score under the risk weighted capital ratio proxy.

The second proxy for the capital factor is the core capital ratio. The formula for the core capital ratio is as follows:

$$\left(\frac{\text{Core Capital}}{\text{Total Risk Weighted Assets}}\right) \times 100 \tag{3.11}$$

The core capital ratio obtained would be scored based on the following range of results as shown in Table 3.9.

Table 3.9: Scoring Grid – Core Capital Ratio (%)

Core Capital Ratio	
Range of Results	**Score**
Core Capital Ratio ≥ 8%	10
Core Capital Ratio ≥ 7% but < 8%	8
Core Capital Ratio ≥ 6% but < 7%	6
Core Capital Ratio ≥ 5% but < 6%	4
Core Capital Ratio ≥ 4% but < 5%	2
Core Capital Ratio < 4%	0

A core capital ratio of 8% and higher gets the full score of 10 while those banks with a score of below 4% would not get any score under the core capital ratio proxy.

ii. Profitability Factor

The profitability factor is further divided into two proxies that is the return on risk weighted asset ratio (%) and mean adjusted return ratio (%). The profitability factor formula for the conventional banks differ from the Islamic banks. There are two formulas used to calculate the return on risk weighted asset ratio for the conventional and Islamic banks respectively, as follows:

Return on Risk Weighted Asset Ratio -For Conventional Banks

$$\frac{\text{Profit/(Loss) Before Taxation and Zakat}}{\left[\begin{pmatrix}\text{Total Risk Weighted Assets}\\ \text{as at 31 December of the}\\ \text{preceding assessment year}\end{pmatrix} + \begin{pmatrix}\text{Total Risk Weighted Assets}\\ \text{as at 31 December of the second year}\\ \text{preceding assessment year}\end{pmatrix}\right]/2}(100) \tag{3.12}$$

Return on Risk Weighted Asset Ratio -For Islamic Banks

The Profit/(Loss) Before Taxation and Zakat is adjusted as follows:

$$\left[\begin{matrix}\text{Profit or (Loss)}\\ \text{Before Taxation and Zakat}\end{matrix}\right] + \left[\begin{pmatrix}\text{Profit Equalization}\\ \text{Reserve} -\\ \text{Profit Equalization}\\ \text{Reserve}\\ \text{Written Back}\end{pmatrix} \text{X} \begin{pmatrix}\dfrac{\text{Capital}}{\text{Capital} + \text{Special Inv}}\\ \text{Deposit} + \text{General}\\ \text{Inv Deposit} +\\ \text{General Inv Deposit}\end{pmatrix}\right] \tag{3.13}$$

The return on risk weighted asset ratio obtained would be scored based on the following range of results as shown in Table 3.10.

Table 3.10: Scoring Grid – Return on Risk Weighted Asset Ratio (%)

Return on Risk Weighted Assets Ratio	
Range of Results	**Score**
Return on Risk Weighted Assets Ratio ≥ 2.75%	8
Return on Risk Weighted Assets Ratio ≥ 2.25% but < 2.75%	6
Return on Risk Weighted Assets Ratio ≥ 1.75% but < 2.25%	4
Return on Risk Weighted Assets Ratio ≥ 1.00% but < 1.75%	2
Return on Risk Weighted Assets Ratio < 1.00%	0

A return on the risk weighted asset ratio of 2.75% and higher would get the full score of 8 while those banks with a score of below 1% would not get any score under the return on risk weighted asset ratio proxy.

The second proxy for the profitability factor is the mean adjusted return volatility. The formula for the mean adjusted return volatility is as follows:

Mean Adjusted Return Volatility

$$\frac{\text{Semi deviation of Profit or (Loss) Before Taxation and Zakat over 3 years}}{\text{Mean Profit or (Loss) Before Taxation and Zakat over 3 Years}} \qquad (3.14)$$

Where the **semi-deviation of profit or loss** before taxation and zakat over 3 years is calculated as per Equation (3.15) while the **mean profit or loss** before taxation and zakat over 3 years is calculated using Equation (3.16).

$$\sqrt{\frac{(b-a)^2(c-a)^2(d-a)^2}{(n-1)}}; n = 3$$

(3.15)

Where a = Mean profit or loss before taxation over 3 years

$$\frac{(b + c + d)}{n}; n = 3$$

(3.16)

b = Profit or loss before taxation and zakat for the 1st preceding assessment year

c = Profit or loss before taxation and zakat for the 2nd preceding assessment year

d = Profit or loss before taxation and zakat for the 3rd preceding assessment year

The mean adjusted return volatility obtained would be scored based on the following range of results as in Table 3.11.

Table 3.11: Scoring Grid – Mean Adjusted Return Volatility

Mean Adjusted Return Volatility	
Range of Results	**Score**
Mean Adjusted Return Volatility ≥ 0 but ≤ 0.3	7
Mean Adjusted Return Volatility > 0.3 but ≤ 0.7	4
Mean Adjusted Return Volatility > 0.7	0
Mean Adjusted Return Volatility is negative or the mean profit / (loss) before tax and zakat is zero	0

A mean adjusted return volatility of between 0 and 0.3 would obtain the full score of 7 while those banks with a score of below 0.7 or negative would not get any score under the mean adjusted return volatility.

iii. Asset Quality Factor

To measure asset quality, the two proxies used are the net impaired loans to capital base ratio and total impaired loans ratio.

Net Impaired Loans To Capital Base Ratio

The formula for the net impaired loans to capital base ratio is as follows:

$$\left[\frac{\text{Total Impaired Loans} - \text{Total Individual Impairment Provisions}^{\wedge}}{\text{Capital Base}}\right] \text{X } 100 \quad (3.17)$$

^This is also referred to as Total Individual Assessment Allowance

The net impaired loans to capital base ratio obtained would be scored based on the following range of results as in Table 3.12.

Table 3.12: Scoring Grid – Net Impaired Loans to Capital Base Ratio

Net Impaired Loans to Capital Base Ratio	
Range of Results	**Score**
Net Impaired Loans to Capital Base Ratio ≤ 20%	8
Net Impaired Loans to Capital Base Ratio > 20% but ≤ 40%	5
Net Impaired Loans to Capital Base Ratio > 40% but ≤ 60%	2
Net Impaired Loans to Capital Base Ratio > 60%	0

A bank with the best net impaired loans to capital base ratio of 20% or less would obtain the full score of 8 while those banks with a larger than 60% net impaired loans to capital base ratio would be worse off with a zero score.

Total Impaired Loans Ratio

The second proxy for the asset quality factor is the total impaired loans ratio. The formula for the total impaired loans ratio is as follows:

$$\left[\frac{\text{Total Impaired Loans}}{\text{Gross Loans}}\right] \text{X } 100 \qquad (3.18)$$

The total impaired loans ratio obtained would be scored based on the following range of results as in Table 3.13.

Table 3.13: Scoring Grid – Total Impaired Loans Ratio

Total Impaired Loans Ratio	
Range of Results	**Score**
Total Impaired Loans Ratio ≤ 4%	7
Total Impaired Loans Ratio > 4% but ≤ 6%	5
Total Impaired Loans Ratio > 6% but ≤ 8%	3
Total Impaired Loans Ratio > 8% but ≤ 10%	1
Total Impaired Loans Ratio > 10%	0

The lower the total impaired loan ratio the better score a bank would obtain for its asset quality. A bank with the best asset quality would have a total impaired loan ratio of 4% and less. Subsequently, this bank would get the highest score of 7 for its asset quality. Meanwhile, banks with total impaired loan ratio of higher than 10% have poor asset quality and obtain a zero score.

iv. Asset Concentration Factor

Unlike the previous factors like capital, profitability and asset quality; the asset concentration factor proxy data requirement were not all available in the annual reports or

financial statements as the data are reported under the Bank Negara Malaysia Financial Institutions Statistical System (BNMs FISS). Therefore, this thesis used instead available information in the banks' annual reports that closely represented the sectors involved.

To measure asset concentration, the two proxies used are the household sector concentration ratio and aggregate sector loans concentration ratio.

Household Sector Concentration Ratio

The formula for the household sector concentration ratio is as follows:

$$\left[\frac{\text{Loans to Household Sector}}{\text{Total Loans Outstanding}}\right] \text{X } 100 \qquad (3.19)$$

Before determining the asset concentration score, the aggregate sector loans concentration ratio has to be calculated first, in two steps as below:-

Aggregate Sector Loans Concentration Ratio

Equation (3.20) determines loans by sectors exceeding 20% of total loans outstanding, which defines the aggregate sector loans concentration ratio (as listed in Table 3.14).

$$\left[\frac{\text{Loans by Sectors}}{\text{Total Loans Outstanding}}\right] \text{X } 100 \qquad (3.20)$$

Step 1: Determine the percentage of each loans by sector out of the total loans outstanding

Step 2: Aggregate each loan by sector that exceeds 20% i.e. sum of all loans by sectors exceeds 20%, then divide with total loans outstanding.

Table 3.14: Lending by Sectors

No.	Sector	No.	Sector
1	Primary Agriculture	7	Transport, Storage and Communication
2	Mining and Quarrying	8	Finance, Insurance and Business Activities
3	Manufacturing (including Agro-Based)	9	Education, Health and Others
4	Electricity, Gas and Water Supply	10	Adjusted Household (excluding purchase of residential property and transport vehicles)
5	Construction and Real Estate Activities	11	Purchase of Residential Property
6	Wholesale and Retail Trade and Restaurants and Hotels	12	Purchase of Transport Vehicles

After both the household sector concentration ratio and aggregate sector loans concentration ratio are calculated using Equation (3.19) and (3.20), respectively, the asset concentration factor is scored based on the following range of results as in Table 3.15.

Table 3.15: Scoring Grid – Asset Concentration

Asset Concentration		
Range of Results		
Household Sector Concentration Ratio	**Aggregate Sector Loans Concentration Ratio - exposures of loans by sectors exceeding 20% of loan outstanding**	Score
Household Sector ≥ 55% of Total Loans Outstanding	Aggregate Sector Loans Concentration ≤ 50%	5
	Aggregate Sector Loans Concentration > 50%	3
Household Sector < 55% of Total Loans Outstanding	Aggregate Sector Loans Concentration ≤ 35%	5
	Aggregate Sector Loans Concentration > 35% but ≤ 50%	3
	Aggregate Sector Loans Concentration > 50% but ≤ 75%	1
	Aggregate Sector Loans Concentration > 75%	0

The asset concentration factor penalizes banks that have exposures of loans by sectors exceeding 20% of total loan outstanding. From Table 3.15, it is noted that a bank with a household sector of 55% or higher of total loans outstanding is better off in comparison to a bank with lower than 55% household sector of total loans outstanding as the lowest score of the former is 3 while the latter is 0.

v. Asset Growth Factor

The final quantitative criteria is the asset growth factor. With the exception of asset concentration factor, akin to the capital profitability and asset quality factor, the asset growth data are also available in the annual reports or financial statements of the individual members' bank. To measure asset growth, the two proxies used are the risk weighted assets to total assets ratio and total assets growth ratio. The equation for the risk weighted assets to total assets ratio is as follows:

$$\left[\frac{\text{Total Risk Weighted Assets} - \text{Risk Weighted Assets for Operational Risk}}{\text{Total Assets} + \text{Credit Equivalent of OffBalance Sheet Items}}\right] \text{X}100$$

(3.21)

Prior to determining the asset growth score, both the risk weighted assets to total assets ratio and the total assets growth ratio have to be calculated. Equation (3.22) corresponds with the total assets growth ratio calculation.

$$\left[\left(\frac{\text{Assets Year 2} + \text{Assets Year 3} + \text{Assets Year 4}/3}{\text{Assets Year 1} + \text{Assets Year 2} + \text{Assets Year 3}/3}\right) - 1\right] \text{X } 100$$

(3.22)

Assets Year 1: Refers to total assets and credit equivalent of off-balance sheet items as of 31 December of the fourth year preceding the assessment year.
Assets Year 2: Refers to total assets and credit equivalent of off-balance sheet items as of 31 December of the third year preceding the assessment year.
Assets Year 3: Refers to total assets and credit equivalent of off-balance sheet items as of 31 December of the second year preceding the assessment year.
Assets Year 4: Refers to total assets and credit equivalent of off-balance sheet items as of 31 December of the first year preceding the assessment year.

After both the risk weighted assets to total assets ratio and the total assets growth ratio have been calculated using Equation (3.21) and (3.22) respectively, the asset growth factor would be scored based on the following range of results as shown in Table 3.16.

Table 3.16: Scoring Grid – Asset Growth

Asset Growth		
Range of Results		
Risk Weighted Assets to Total Assets Ratio	**Total Asset Growth Ratio**	**Score**
Risk Weighted Assets to Total Assets Ratio < 70%	Total Asset Growth Ratio < 20%	5
Risk Weighted Assets to Total Assets Ratio < 70%	Total Asset Growth Ratio ≥ 20%	3
Risk Weighted Assets to Total Assets Ratio ≥ 70%	Total Asset Growth Ratio < 20%	1
Risk Weighted Assets to Total Assets Ratio ≥ 70%	Total Asset Growth Ratio ≥ 20%	0

Under the asset growth scoring grid, banks with a total asset growth ratio of 20% and higher but with risk weighted assets to total assets ratio of 70% and higher are worst off as the score for their asset growth would be zero. In contrast, the highest score of 5 is given to a bank that has a risk weighted assets to total assets ratio of lower than 70% and total asset growth ratio of lower than 20%.

3.2.3.2.2 Total Insured Deposits Computation

The amount of total insured deposit for conventional and Islamic deposits is calculated separately and is derived in Equation (3.23) below.

Total Insured Deposits = Total Insurable Deposits – Aggregated Deposits Balances in Excess of RM60,000 (3.23)

In this thesis, the total insurable deposits is defined as 90% of customer deposits. The aggregated balances in excess of RM60,000 are calculated from a percentage of the total insurable deposits. The notes to the account in the annual report of each individual bank in the sample for the period 2006 until 2010 are scrutinized to identify the percentage trend of bank deposits by type of customer i.e. corporate deposits, retail (individual) deposits or combination of both corporate and retail deposits. Then each bank is classified into three categories, namely banks with majority retail deposits, banks with majority corporate deposits and banks with equal deposits from retail and corporate accounts.

If banks have mainly corporate deposits, 90% of total insurable deposits are assigned to account for the aggregated deposit balances in excess of RM60,000. This is based on the assumption that corporate depositors generally have deposited more than RM60,000 in one individual account. However, banks with high retail deposits and banks with equal amount of retail and corporate deposits are assigned 70% and 75% of total insurable deposits respectively.[36] The logic of defining the aggregated deposit balances in excess of RM60,000 in the above manner is a reflection that the deposit insurance system protects a

[36] This alternative total insured deposits computation is derived from several discussions with Malaysia Deposit Insurer Corporation official. The percentages of total insurable deposits to account for the aggregated deposits balances in excess of RM60,000 are derived based on the assumptions that are believed to be consistent with MDIC calculations.

relatively higher percentage of retail depositors but a smaller percentage of corporate creditors to provide market discipline (Garcia, 2000).

3.2.4 Data 2: Dynamic Panel Data

Reminiscence from Section 3.1.2, the sample includes 22 conventional banks both local as well as foreign owned incorporated in Malaysia and 18 Islamic banks both local and foreign owned which are mandatory members' bank under the explicit deposit insurance system administered by MDIC. However, the period of study only covers the period after the introduction of deposit insurance in Malaysia that is from 2006 until 2010.[37] For each bank, there must be at least three years of data. The data are a balanced panel. The five deposit taking institutions such as the development financial institutions that are not mandatory members of the deposit insurance protection system are excluded from the sample. Being state-owned banks, these DFIs[38] have some form of implicit guarantee by the government on the deposits even prior to the introduction of deposit insurance system in Malaysia. The other more specialized institutions, like investment banks are also not included in the sample.

This thesis uses secondary data in gathering information pertaining to the research topic. The data were collected personally from the banks' financial statements as of calendar year-end either from the Bankscope[39] or individual bank's annual report. Our major data source is from the annual reports of individual banks, particularly the Islamic banks as banks that operate Islamic banking window report their Islamic banking operations under

[37] The period before the introduction of deposit insurance (year 2002-2005) is excluded. The insurance premium system is one of the design features of a deposit insurance. In 2006 and 2007 the flat rate premium was adopted while from 2008 to 2010 the risk-based premium was adopted.

[38] The DFIs are also excluded from the sample as these banks do not report some of the data requirement listed in Table 5.1 such as the risk weighted asset and risk weighted capital ratio.

[39] Bankscope is a database of bank account figures by Bureau Van Djik, a publisher of financial database.

the Income Statement notes to the account. The breakdown of the Islamic banking activity is only reported in the notes to the account in the respective banks individual annual report. The study would use the bank's unconsolidated statements wherever available.

3.2.5 Methodology 2: A Dynamic Panel Regression

The dynamic panel regression is used to investigate the sensitivity of the insurance premium in a risk-based premium with bank risk post deposit insurance system. The dynamic panel regression is appropriate for the study model as per the detail explanation in Section 3.1.3. To test Hypothesis 7 and Hypothesis 8 on page 102, the relevant model follows a one-way error component model and written as follows:

$$NPLTA_{i,t} = \beta_0 Y_{NPLTAi,t-1} + \beta_1 RISKBASED_{i,t} + \beta_2 PREMIUM_{i,t} + \beta_3 RISKBASEDxPREMIUM_{i,} + \beta_4 FOREIGN_{i,t} + \beta_5 RWCR_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SIZExPREMIUM_{i,t} + error_{i,t} \quad (3.24)$$

$$ZSCORE_{i,t} = \beta_0 Y_{ZSCOREi,t-1} + \beta_1 RISKBASED_{i,t} + \beta_2 PREMIUM_{i,t} + \beta_3 RISKBASEDxPREMIUM_{i,} + \beta_4 FOREIGN_{i,t} + \beta_5 RWCR_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SIZExPREMIUM_{i,t} + error_{i,t} \quad (3.25)$$

$$OVERHEADTA_{i,t} = \beta_0 Y_{OVERHEADTAi,t-1} + \beta_1 RISKBASED_{i,t} + \beta_2 PREMIUM_{i,t} + \beta_3 RISKBASEDxPREMIUM_{i,} + \beta_4 FOREIGN_{i,t} + \beta_5 RWCR_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SIZExPREMIUM_{i,t} + error_{i,t} \quad (3.26)$$

Where:

$NPLTA_{i,t}$ = the ratio of non-performing loans to total asset of the bank *i* at time *t*

$ZSCORE_{i,t}$ = the risk index of bank *i* at time *t*

$OVERHEADTA_{i,t}$ = the ratio of overhead expenses to total asset of bank *i* at time *t*

$Y_{BANK\ RISK\ it-1}$ = the lagged dependent variable (NPLTA, ZSCORE & OVERHEADTA) of bank *i* at time *t*

RISKBASED = a dummy variable: one for risk-based assessment method; zero for flat rate assessment method.

PREMIUM = the annual premium estimated paid by bank *i* at time *t*

$FOREIGN_{i,t}$ = a dummy variable: one for foreign banks; zero for local banks

$RWCR_{i,t}$ = the risk weighted capital ratio of bank *i* at time *t*

$SIZE_{i,t}$ = the natural log of total assets of bank *i* at time *t*

$error_{i,t}$ = is the error term

To test Hypothesis 7 and 8, this study runs the full sample after the introduction of deposit insurance system with three equations as above. The sample is a balanced panel. The equation above is first estimated by the ratio of non-performing loans over total asset (NPLTA) for the credit risk measure as the dependent variable. Then, the same model is re-estimated with the ZSCORE and the ratio of overhead expenses to total asset (OVERHEADTA) including the three explanatory variables.

Since the two hypotheses attempt to investigate whether the deposit insurance premium sensitivity improves in the risk-based premium assessment method and whether the

magnitude of the annual premium paid is associated with bank risk, the thesis only considers the bank year's observations after the introduction of deposit insurance. The prediction of premium sensitivity towards bank risk in a risk-based premium system provides useful insights in explaining whether the insurance premium system i.e. the estimated insurance premium and the risk-based premium assessment method, has a direct relationship with bank risks thus indicating credibility of the policy to mitigate the moral hazard problem.

3.2.5.1 Dependent variables[40]

The dependent variables (NPLTA, ZSCORE & OVERHEADTA) are similar to the one described in detail in Section 3.1.3.1 from page 95 to page 97.

3.2.5.2 Explanatory Variables

The explanatory variables in Equation (3.24) until (3.26) are defined as follows:

Annual Premium Paid

This thesis estimates the annual premium paid; PREMIUM by banks based on the MDIC Guidelines. The methodology to estimate the annual insurance premium paid is given in detail in Section 3.2.3 on pages 105-124. For the period 2006-2007, the annual premium paid is estimated based on the flat rate premium as in Section 3.2.3.1. Meanwhile, for the

[40] The explanatory variables are selected based on the current literature on deposit insurance. The literature presented in Section 2.3 covers past studies that not only includes cross sectional studies for developed and developing countries but also country specific studies like US, Bolivia, Turkey, Indonesia and Russia. The variables are derived from annual reports which are mostly the accounting-based variables. The annual reports of the Malaysian firms not only meet the standard prescribed by the Malaysian Accounting Standard Board but also comply with the international standard prescribed by the International Accounting Standards Board of the IFRS.

period 2008-2010, the annual premium estimated is based on the risk-based premium as in Section 3.2.3.2.

Premium Assessment Method

A dummy variable; RISKBASED takes the value one if the observation is from 2008-2010 (premium calculated under the risk-based assessment method) and zero if the observation is from 2006-2007 (premium calculated under the flat rate assessment method). This is similar to current literature on deposit insurance that investigates the credibility of the flat rate premium versus risk-based premium in different countries with deposit insurance system.[41] The annual premium paid by each insured banks would change the banks' risk taking as the premium rate is determined using a scoring grid based on the individual bank's risk profile. As such, banks with a higher risk profile would pay a higher premium than the banks with lower risks. The FDIC was the first deposit insurer in the world that implemented a risk-based premium system in 1993. Since then, a number of 24 countries[42], including Malaysia, have adopted it.

Premium*Riskbased

To examine the sensitivity of annual premium in the risk-based deposit insurance system with bank risk, this study interacted the PREMIUM variable with the RISKBASED variable. The annual premium is expected to be more sensitive with bank risk in a risk-based deposit insurance premium.

[41] Literature suggests that the risk-based premium method would mitigate the moral hazard problem (see for example Cull, Senbet, & Sorge, 2005; Demirguc-Kunt & Detragiache, 2002; Demirguc-Kunt & Huizinga, 2004)

[42] Argentina, Canada, Colombia, Finland, France, Germany, Italy, Kazakhstan, Malaysia, Marshal Island, Micronesia, Netherlands, Nicaragua, Nigeria, Peru, Poland, Portugal, Romania, Singapore, Sweden, Taiwan, Turkey, United States & Uruguay.

3.2.5.3 Control Variables

In investigating the relationship between risk and the explanatory variables, five other variables have to be taken into account, that are controlled for in this thesis, as shown in Equations (3.24) to (3.26).

Ownership

Foreign banks normally look at possible risk exposure in the initial stage of their product financial innovation by employing more sophisticated technology. In addition, foreign banks might employ more sophisticated risk management tools and a better internal control system. This means the foreign banks have fewer incentives to increase their risk taking behavior in deposit insurance protection. In addition, foreign banks have the capacity to diversify their asset portfolio across countries. Hence, this thesis controls for bank ownership by differentiating the two types of bank ownership, foreign and local banks that present in the Malaysian banking system. A dummy variable takes the value one if the bank is a foreign bank and zero if it is a local bank.

Bank Size

The thesis includes the log of total assets in *Ringgit Malaysia* to control for bank size. Larger banks usually have a greater potential to diversify their asset risk. They thus have stable earnings and have no incentives to increase bank risk taking. Alternatively, the larger the banking firm, the greater the chances to increase risk taking, if the banks consider they are too big to fail. If too-big-to-fail guarantees were present in the Malaysian banking system, one would expect the large banks to take more risk than the smaller banks.

Premium*Bank Size

Risk is embedded in the banks' asset (size), thus big banks are expected to pay higher deposit insurance premium. In a different twist, a small bank might end up paying a higher premium than the actual estimation if the actual premium computed is lower than the mandatory RM250,000. Moreover, the correlation structure in Table 5.1 (Chapter 5) and Table 4.2 (Chapter 4) showed that there is a strong and significant correlation (0.704) between PREMIUM and SIZE. Hence, to control for the impact of premium on bank size in the model, this study also controls, apart from the size variables, the variable that interacts the bank size with deposit insurance premium.

Regulatory variables: **Risk Weighted Capital Adequacy Ratio (CAR)**

Capital is the primary cushion against adverse changes in the bank's asset quality and earnings. RWCR is controlled for in this thesis equation to provide the different level of riskiness among the banks due to regulatory limitations. An increase in RWCR indicates that banks decreasing their assets or increasing their capital would have a positive effect on bank operations as banks have sufficient buffer to handle unexpected adverse shocks. When banks reduce lending, leverage falls as assets comprise mostly of loans. Thus, regulatory pressure could prevent the banks from taking high risks following the introduction of deposit insurance.

General Macroeconomic Conditions

As in other studies, this thesis incorporates elements to check macroeconomic situation. Earlier studies such as Mannasoo and Mayes (2009) and Bonfim (2009) have shown that adverse macroeconomic conditions normally herald bank failures. Further, the present

world predicament calls for a good grasp of the potential consequences of adverse macroeconomic conditions on the buoyancy of the banking system. Chernykh and Cole (2011) applied year dummy variables to control for overall macroeconomic situations. On the other hand, Ioannidou and Penas (2010) used among others the Gross Domestic Product growth rate and the inflation rate to control for general macroeconomic conditions.

Since macroeconomic factors are common factors that affect all the banks in a certain period, though they vary from period to period, their effects could be captured simply by including time-specific effects in the regression. The time dummies is a collection of dummy variables; (n=T-1) where T is the number of years included in the study which are equal to 1 for one given year and zero otherwise. As there are nine years in the sample period, the research would have eight time dummies. The inclusion of time fixed effects is one way of capturing the effect of unobservable common factors that vary with time but are constant for all banks. Similar to Chernykh and Cole (2011), this study uses year dummy variables to control for general macroeconomics conditions such as inflation, household income, economic growth etc. and seasonal effects apart from the presence of explicit deposit insurance itself.

3.3 Summary

This chapter establishes the justification for the dynamic panel regression model and elaborates the data selection and analysis techniques. Section 3.1.1 and 3.2.1 outline the development of eight hypotheses in this study. The main methodology used in this thesis is the dynamic panel regression. The dynamic panel regression model is estimated using the System Generalized Method of Moment.

Apart from that, this thesis estimates the bank's annual premium paid by employing the insurance premium assessment methodology (as per Guidelines issued by MDIC). The annual insurance premium is estimated to investigate the sensitivity of the deposit insurance premium in the risk-based deposit insurance as part of an effective deposit insurance design. The complete computation of the deposit insurance premium is discussed in detail under Section 3.2.3. Finally, the link between the hypotheses developed and the research objectives are shown in Table 3.17 on page 133. Table 3.18 until 3.20 on page 134 and 135 summarizes the hypothesis statements and the expected sign.

Table 3.17: The Link between the Objectives and the Hypotheses of the Thesis

Objectives	Hypothesis
To investigate the presence of moral hazard by way of increased bank risk in the Malaysian banking system after the introduction of deposit insurance system.	H1: Bank risk in the form of financial risk increases after the introduction of a deposit insurance system.
	H2: Bank risk in the form of operational risk increases after the introduction of a deposit insurance system.
To evaluate and compare the risk taking behavior of the conventional and Islamic banks after the introduction of deposit insurance in the Malaysian banking system.	H3: Bank risk in the form of financial risk increases in the conventional banks after the introduction of a deposit insurance system.
	H4: Bank risk in the form of operational risk increases in the conventional banks after the introduction of a deposit insurance system.
	H5: Bank risk in the form of financial risk increases in the Islamic banks after the introduction of a deposit insurance system.
	H6: Bank risk in the form of operational risk increases in the Islamic banks after the introduction of a deposit insurance system.
To ascertain whether the deposit insurance premium is sensitive towards bank risk in the risk-based premium system in mitigating the moral hazard problem.	H7: The risk-premium sensitivity significantly improves in the risk-based premium assessment method.
	H8: The magnitude of the annual premium paid is positively associated with the bank risk.

Table 3.18: The Hypotheses Statement and Expected Sign of Bank Risk and Deposit Insurance

Hypothesis Statements	Variables (Expected sign)
H1: Bank risk in the form of financial risk increases after the introduction of a deposit insurance system.	NPLTA & POSTDI (+ve) ZSCORE & POSTDI (-ve)
H2: Bank risk in the form of operational risk increases after the introduction of a deposit insurance system.	OVERHEADTA & POSTDI (+ve)

Table 3.19: The Hypotheses Statement and Expected Sign of Bank Risk and Deposit Insurance (Conventional vs Islamic)

Hypothesis Statements	Variables (Expected sign)
H3: Bank risk in the form of financial risk increases in the conventional banks after the introduction of a deposit insurance system.	NPLTA & POSTDI (+ve) ZSCORE & POSTDI (-ve)
H4: Bank risk in the form of operational risk increases in the conventional banks after the introduction of a deposit insurance system.	OVERHEADTA & POSTDI (+ve)
H5: Bank risk in the form of financial risk increases in the Islamic banks after the introduction of a deposit insurance system.	NPLTA & POSTDI (+ve) ZSCORE & POSTDI (-ve)
H6: Bank risk in the form of operational risk increases in the Islamic banks after the introduction of a deposit insurance system.	OVERHEADTA & POSTDI (+ve)

Table 3.20: The Hypotheses Statement and Expected Sign of Insurance Premium Sensitivity and Bank Risk in a Risk-based Premium

Hypothesis Statements	Variables (Expected sign)
H7: The risk-premium sensitivity significantly improves in the risk-based premium assessment method.	NPLTA & RISKBASED (+ve) ZSCORE & RISKBASED (-ve) OVERHEADTA & RISKBASED (+ve)
H8: The magnitude of the annual premium paid is positively associated with the bank risk.	NPLTA & PREMIUM (+ve) ZSCORE & PREMIUM (-ve) OVERHEADTA & PREMIUM (+ve)

Chapter 4 : Deposit Insurance and Bank Risk

4.0 Introduction

This chapter discusses the empirical findings with regards to bank risk taking after the introduction of deposit insurance to the conventional and the Islamic banking systems in Malaysia. The chapter is organized as follows. Section 4.1 examines and explains the various banks-specific characteristics in addition to explanation for the observed trend. Sections 4.2 and 4.3.1 discuss the correlation structure and diagnostic tests respectively. The empirical findings from the first research objective (bank risk and deposit insurance for all banks) are presented in Sections 4.3.2, Section 4.3.3 and 4.3.4 that deliberate the estimation results for conventional and Islamic banks. Section 4.3.5 contains the robustness check. Finally, the summary of this chapter is presented in Section 4.4.

4.1 Preliminary Analysis

The descriptive indicators for all the variables used in this study are presented in Table 4.1. The mean, median, minimum, standard deviation and the number of observations for each variable are reported. The number of some observations differs across variables due to lack of data. The descriptive indicators in Table 4.1 combine the data from all banks and years.

Table 4.1: Descriptive Indicators for the Variables of this Study

Variables	N (bank years)	Mean	Median	Std. Dev	Min
Panel A: Full Sample					
NPLTA	343	3.05	1.92	3.54	0
ZSCORE	345	29.99	19.58	30.75	-26.14
OVERHEADTA	345	1.285	1.24	1.67	0.03
POSTDI (Dummy)	345	-	1	-	0
PREMIUM (RM million)	200	2.42	0.46	4.24	0.25
RISKBASED (Dummy)	200	-	1	-	0
SIZE (RM million)	345	26943.77	9369.6	42833.29	93.06
RWCR	345	24.61	14.44	29.36	-2.84
FOREIGN	345	-	0	-	0
Panel B: Conventional versus Islamic banks					
Conventional banks					
NPLTA	196	3.49	2.34	3.85	0.006
ZSCORE	198	37.82	23.67	34.80	-26.14
OVERHEADTA	198	1.32	1.32	0.45	0.22
POSTDI (Dummy)	198	-	1	-	0
PREMIUM (RM million)	110	3.82	2.10	5.23	0.25
RISKBASED (Dummy)	110	-	1	-	0
SIZE (RM million)	198	41082.41	27664.95	50368.57	516.5
RWCR	198	25.74	14.35	28.82	9.16
FOREIGN	198	-	1	-	0
Islamic banks					
NPLTA	147	2.47	1.18	3.01	0
ZSCORE	147	19.44	16.12	19.97	-15.46
OVERHEADTA	147	1.24	0.91	2.51	0.03
POSTDI (Dummy)	147	-	1	-	0
PREMIUM (RM million)	90	0.70	0.27	1.09	0.25
RISKBASED (Dummy)	90	-	1	-	0
SIZE (RM billion)	147	7899.90	5373.31	7993.16	93.06
RWCR	147	22.93	14.5	30.06	-2.84
FOREIGN (Dummy)	147	-	0	-	0

Note:
NPLTA Ratio of non-performing loans to bank asset
ZSCORE The risk index
OVERHEADTA Ratio of overhead expenses to bank asset
PREMIUM Annual premium in RM
RWCR Risk weighted capital adequacy ratio
SIZE The log total assets
RISKBASED Dummy variable (1=risk-based premium; 0=flat rate premium)
POSTDI Dummy variable (1=post deposit insurance period; 0=pre deposit insurance period)
FOREIGN Dummy variable (1=foreign banks; 0=local banksj)

Table 4.1: Descriptive Indicators for the Variables of this Study (continue)

Variables	N (bank years)	Mean	Median	Std. Dev	Min
Panel C: Foreign versus Local banks					
Foreign banks					
NPLTA	167	1.71	0.89	2.28	0
ZSCORE	169	34.93	17.62	38.64	-19.37
OVERHEADTA	169	1.38	1.19	2.29	0.05
POSTDI (Dummy)	169	-	1	-	0
PREMIUM (RM million)	100	0.72	0.25	0.97	0
RISKBASED (Dummy)	169	-	1	-	0
SIZE (RM million)	169	12378.52	4071.6	15858.79	93.06
RWCR	169	34.58	17.96	38.83	0
Local banks					
NPLTA	176	4.32	3.12	4.03	0
ZSCORE	176	25.24	21.08	19.47	-26.14
OVERHEADTA	176	1.19	1.26	0.66	0.03
POSTDI (Dummy)	176	-	1	-	0
PREMIUM (RM million)	100	4.18	2.42	5.36	0.15
RISKBASED (Dummy)	100	-	1	-	0
SIZE (RM billion)	176	40929.73	20213.9	52886.77	521.23
RWCR	176	14.89	13.56	7.34	-2.84

The sample consists of 345 bank year observations. As there is a dual banking system in Malaysia, the majority of our sample is drawn from the conventional banks (57%) while the remaining comprise the Islamic banks (43%). By ownership, 51% of our full observations are local banks while 49% are foreign banks. The foreign-owned banks are the majority (60%) in our observations in the conventional banks category while local Islamic banks (60%) dominate our Islamic bank observations.

In the full sample, the dependent variables; NLPASSET, ZSCORE and OVERHEADTA have a mean of 3.05%, 29.99% and 1.28% respectively. It appears that there is not much difference in the dependent variables between the Islamic and the conventional banks. In general, the risk weighted capital ratio (RWCR) of the Malaysian banks are on average 24.61% which exceeds the minimum requirement of 8% under Basel II and 10.5% under

Basel III. This indicates the banks have more than sufficient capital buffer. The median banks have RM9.37 billion of total assets. On average, the Islamic banks' asset size is relatively smaller (RM7.89 billion) compared to the conventional banks (RM41.08 billion).

The explanatory variables are the deposit insurance period; POSTDI, the insurance premium system; RISKBASED and the annual premium paid by banks; PREMIUM. The Malaysian banks on average paid an annual premium of RM3.82 million with a median of RM460,000. This amount is considered to be very small as it approximately less than 1% of the banks' profit. The minimum annual premium paid by the conventional banks and Islamic banks is RM250,000 as required by the MDIC Act. The risk-based premium was implemented in 2008 and is in force until today. Under a risk-based premium, each member bank's annual premium could be different as it is calculated according to the individual risk categories. However, the banks are subjected to a minimum annual risk premium of RM250,000. Thus, if the premium calculated under the risk-based premium is lower than the stipulated amount, the banks are mandated to pay a minimum amount of RM250,000. The annual premium median for the Islamic banks is RM270,000 while the median for the conventional banks is RM2.1 million.

In Panel C of Table 4.1 are descriptive statistics on the foreign and local banks of this study sample. Average assets of the local banks are almost four times higher than the foreign banks. Consequently, the average and the median annual premiums for the local banks are also higher than the foreign banks. The average annual premium for the local banks are RM4.18 million in contrast to the average foreign banks' annual premium of RM720,000. The median annual premium for the local and foreign banks are RM2.42 million and RM250,000 respectively.

However, since these indicators do not show how each variable progress over time, Figures 4.1 to 4.3 present the evolution in the yearly mean of the dependent variables (risk proxy) for all banks over the period under study from 2002 until 2010.

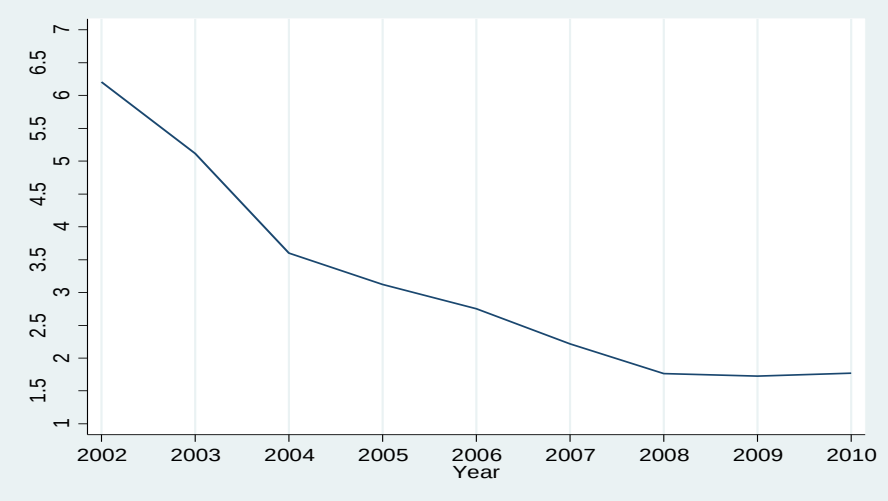

Figure 4.1: Mean of NPL Ratio, 2002-2010 (All banks)

From Figure 4.1, the first bank risk proxy, the non-performing loan to asset ratio shows a declining trend that indicates the improvement of the banks' quality of assets over the period under study. This trend suggests that the introduction of deposit insurance in 2006 may have no impact on bank credit risk. However, the graph (Figure 4.2) shows a fluctuation in the ZSCORE.

The ZSCORE deteriorates after the introduction of deposit insurance in 2006. In the 2007/ 2008 financial crisis period, it is noted the ZSCORE declines further concurrently with and subsequent to the financial crisis where it dips to a bottom in 2009. This decline indicates that the banking industry in Malaysia was also affected by the instability stemming from the global financial crisis. However, the ZSCORE improves thereafter. This is credited to the banking sector reforms that were undertaken in the aftermath of the Asian financial crisis. The consolidation of the banking sector and improved risk management practices

were amongst some of the reforms undertaken. These reforms have improved the financial stability of the banks which in turn strengthened the foundation of the Malaysian banking sector. Thus, a higher ZSCORE reflects the banks are in greater financial strength with low probability to become insolvent, thus they are more stable.

Figure 4.2: Mean of ZSCORE, 2002-2010 (All banks)

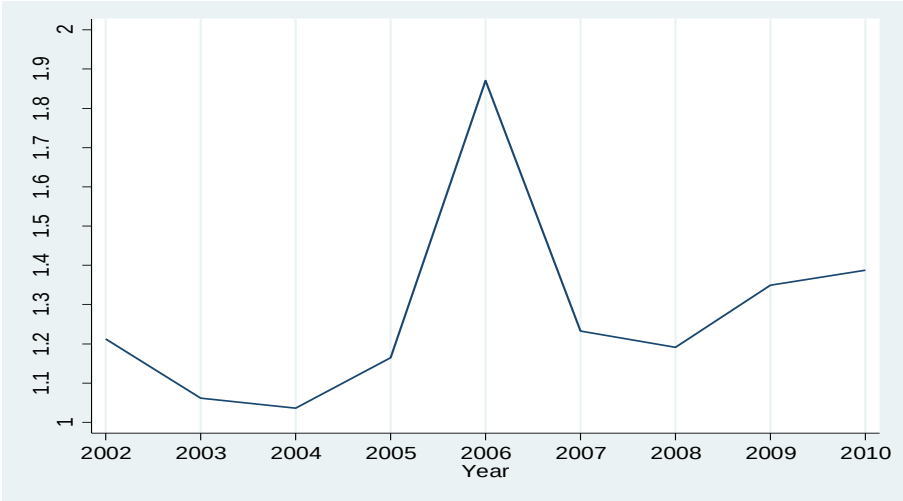

Figure 4.3: Mean of Overhead to Asset Ratio, 2002-2010 (All banks)

On the other hand, the overhead to asset ratio (Figure 4.3) is at its highest level in 2006 which was the year the deposit insurance system was introduced. The yearly mean of the overhead to asset ratio, a proxy for operational risk ranged from a high of 1.8% to a low of 1.05%. After the dissipation of the financial crisis of 2007/2008, the banks increased their operational risk taking to grow and expand their asset (Figure 4.6) by leveraging on the deposit insurance protection.[43]

Figure 4.4: Mean of Annual Premium, 2002-2010 (All banks)

Malaysia adopted the flat rate premium assessment method in the early years of the deposit insurance system (from the year 2006-2007). However, commencing from 2008 onwards, the premium is calculated on a risk-based formula. Under the risk-based premium, the prescribed risk category rate differs from each bank depending on the bank's risk profile. From Figure 4.4 above, the mean of annual premium declines gradually from the year 2008 following the implementation of risk-based deposit insurance premium. It appears that the banks pay a lower premium in the risk-based deposit insurance period compared to the flat

[43] During the period 2008-2010, the government blanket guarantee was also introduced. Apart from paying the annual insurance premium, the banks are required to pay a fee to the Government - the Ministry of Finance (not MDIC) for this guarantee.

rate premium era. The mean of the annual premium ranges from RM2.1 million in 2006 to a highest of RM2.8 million in 2008.

Figure 4.5: Mean of Risk Weighted Capital Ratio, 2002-2010 (All banks)

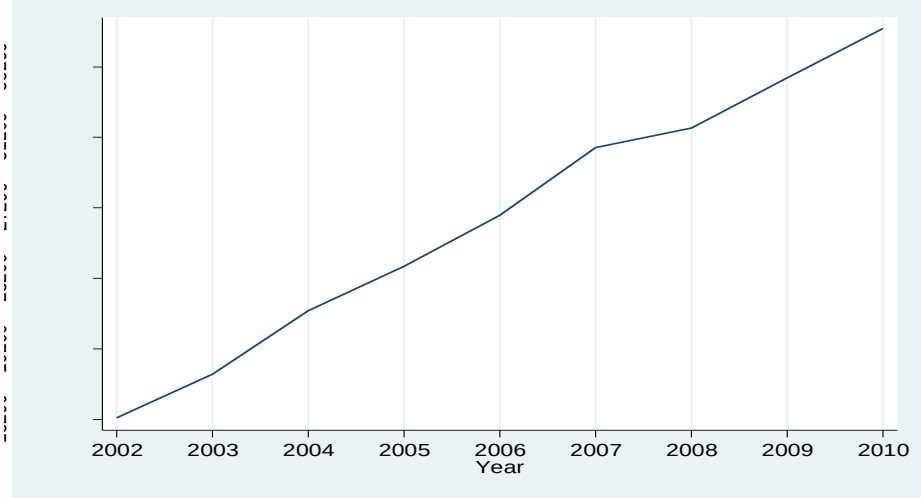

Figure 4.6: Mean of Total Assets, 2002-2010 (All banks)

Figure 4.5 and Figure 4.6 above depict the evolution for the mean of risk weighted capital ratio (RWCR) and mean of total assets (size). The mean of RWCR bottomed out in 2008 but rose steadily to peak in 2009. Although the mean of RWCR slightly dropped thereafter, the capital buffer was still sufficient and exceeded the minimum requirement under Basel II of 8% and Basel III of 10.5%. The banks' asset size rose steadily after 2008.

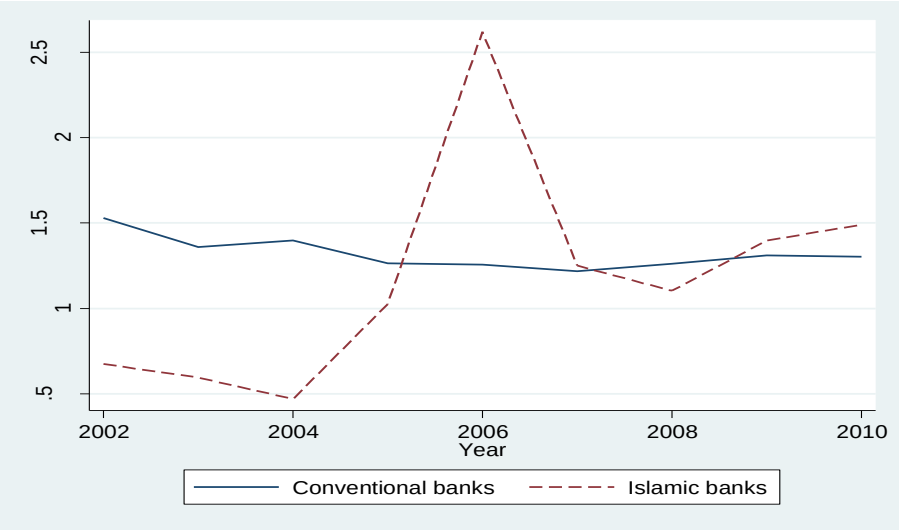

Figure 4.7: Mean of Overhead to Asset Ratio, 2002-2010 (Conventional vs Islamic banks)

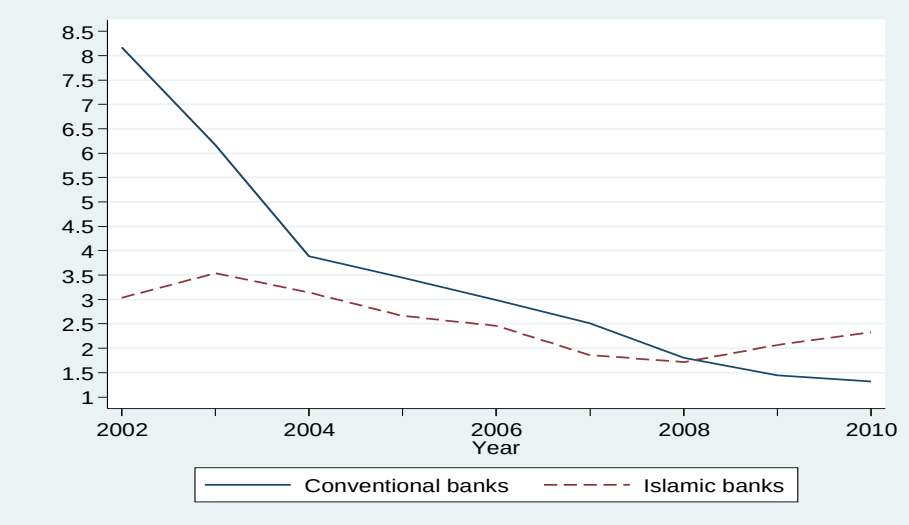

Figure 4.8: Mean of NPL ratio, 2002-2010 (Conventional vs Islamic banks)

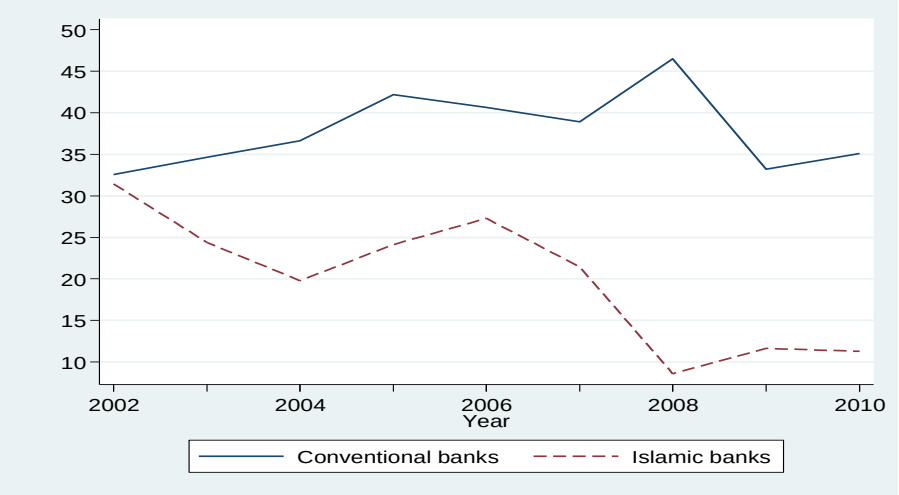

Figure 4.9: Mean of ZSCORE, 2002-2010 (Conventional vs Islamic banks)

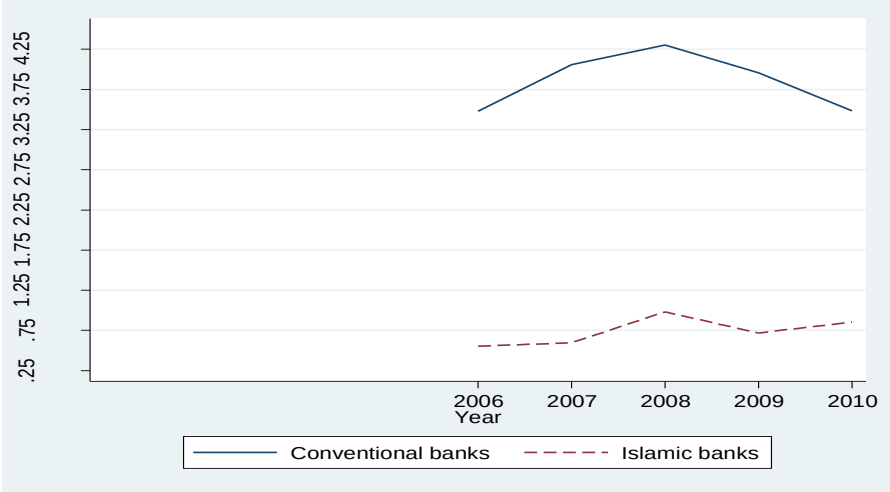

Figure 4.10: Mean of Annual Premium, 202-2010 (Conventional vs Islamic banks)

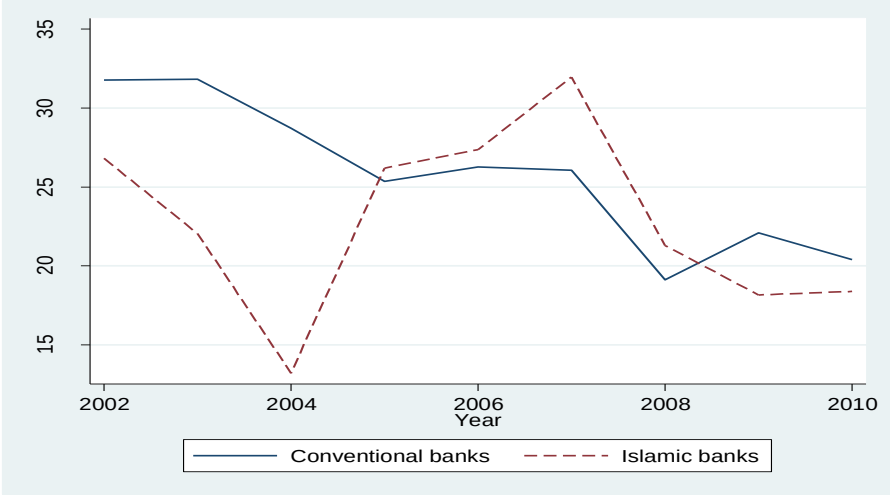

Figure 4.11: Mean of Risk Weighted Capital Ratio, 2002-2010 (Conventional vs Islamic banks)

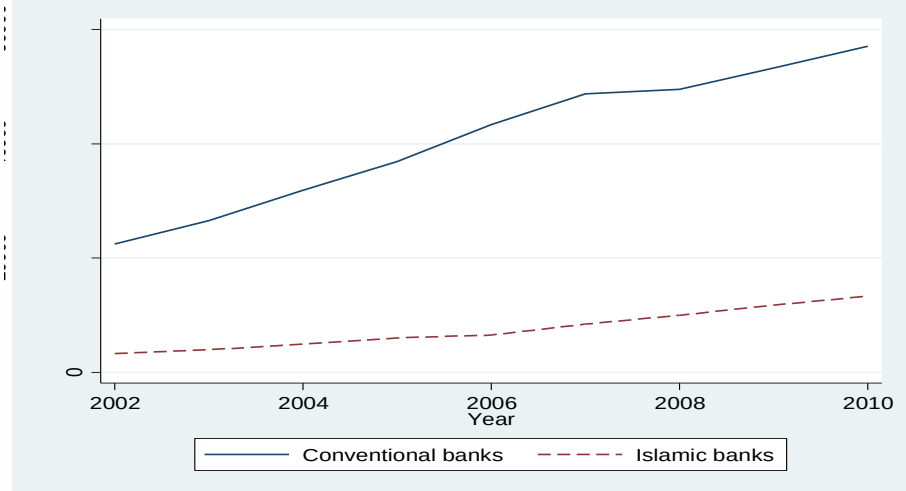

Figure 4.12: Mean of Total Assets, 2002-2010 (Conventional vs Islamic banks)

Figure 4.7 until Figure 4.12 above compare the yearly mean of the dependent variables and other variables for the conventional and Islamic banks over the 2002-2010 periods. Movement in the overhead to asset ratio[44] for both the conventional and Islamic banks is primarily driven by the increase in the overhead expenses that moved in tandem with the expansion of the banks' lending business activities. It is noted the overhead to asset ratio is comparatively higher in the Islamic banks than the conventional banks in 2006 and after 2008 that is both during the period of deposit insurance protection. Islamic banks experienced a higher overhead to asset ratio as supported by the growth in Islamic financing activities. Effort to position Malaysia as an International Islamic financial hub under the [45]Malaysia International Islamic Financial Centre initiate have spurred the momentum for active recruitment activities of Islamic banking professionals and strengthened the Islamic banks' information technology infrastructure during 2006. Furthermore, this trend was boosted with an increase in the number of full-fledged Islamic banks with an addition of three new Islamic banking licenses which were issued to foreign bankers. Meanwhile, the ZSCORE in the conventional and Islamic banks both fluctuated before it peaked in 2008 in the conventional banks.

For the period 2002-2010, the NPL yearly mean for the conventional bank is higher than the Islamic banks. Similarly, during the global financial crisis period of 2007/2008, the conventional banks experienced a deterioration in asset quality whereas the asset quality in the Islamic banks indicated an improvement. This trend exhibits sound asset quality in the Islamic banks despite a crisis. Unlike conventional banks, Islamic banks are governed by *Shariah* principles that require financial transactions to be backed by underlying assets, thereby insulating the Islamic banks from excessive risk taking and speculative financing

[44] Overhead to asset ratio is the measure for operational risk in this study.
[45] During 2006, the Malaysia International Islamic Financial Centre (MIFC) initiative was launched to promote Islamic financial products and services in international currencies for the global market.

activities. Regardless of this, during the period under study, the banking assets of the conventional and Islamic all showed an increase. It is evident that the conventional banks are larger than the Islamic banks in terms of asset size. The mean assets in the conventional banks and Islamic bank for the year 2010 was close to RM60 billion and RM15 billion respectively. In relation to the annual premium, both the conventional and Islamic banks' annual premiums peaked in 2008, just before the implementation of the risk-based premium assessment method then declined steadily after the implementation of the risk-based deposit insurance premium.

The conventional and Islamic banks continued to be well capitalized with strong financial buffers to withstand potential losses. One substantial fact was that Islamic banks had higher capitalization that indicated greater flexibility and resilience to withstand the global financial crisis of 2007/2008. Although the RWCR ratio fluctuated over time, the ratio is well above the minimum requirement of 8% (Basel II) and 10.5% (Basel III) which indicated sound adequacy of capital buffer. Overall, there is a significant difference between the evolution of yearly mean for the variables as discussed above, in the conventional and Islamic banks during the period under study.

4.2 Correlation Structure

A bivariate relationship between the variables of the models in this study is first determined before estimating the model equations. Specifically, this study analyzes the correlation coefficients between variables of each equation. Correlation analysis is performed for two reasons. Firstly, the bivariate relationship between the dependent variable and each of the explanatory variables help to explore the direction and strength of the relationship,

regardless of the existence of other variables. Finally, the high correlation between explanatory variables may indicate, but not necessarily, a multicollinearity problem.

Table 4.2: The Pairwise Correlation Matrix for Dependent Variables (NPL, ZSCORE & OVERHEADTA) and Explanatory Non-dummy Variables

	NPL	ZSCORE	OPRISK	PREMIUM	SIZE	RWCR
NPL	1.000					
ZSCORE	0.046 (0.387)	1.000				
OPRISK	0.036 (0.508)	-0.024 (0.661)	1.000			
PREMIUM	0.221*** (0.002)	0.141** (0.046)	-0.013 (0.855)	1.000		
SIZE	0.248*** (0.000)	0.395*** (0.000)	-0.001 (0.984)	0.704*** (0.000)	1.000	
RWCR	-0.179*** (0.001)	-0.253*** (0.000)	0.299*** (0.000)	-0.186*** (0.008)	-0.512*** (0.000)	1.000

Note: This table presents the correlation results.
The p-value is in parentheses. *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPL	- Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE	- The risk index (proxy for insolvency risk)
OPRISK	- Ratio of overhead expenses to bank asset (proxy for operational risk)
PREMIUM	- Estimated annual insurance premium
SIZE	- Log of total assets
RWCR	- The risk weighted capital adequacy ratio

Table 4.2 above reports the Pearson pairwise correlation coefficient for all banks over the period 2002-2010. Although the correlation coefficients are low but some them are statistically significant. The correlations indicate NPL is significantly correlated with the PREMIUM (0.221), SIZE (0.248) and the RWCR (-0.179). Similarly, the second dependent variable, ZSCORE is significantly correlated with the PREMIUM, SIZE and RWCR. The third dependent variable, OPRISK is statistically significant with RWCR (0.299).

The correlation coefficients among the explanatory variables are low but are statistically significant. There is a strong and significant correlation (0.704) between PREMIUM and SIZE. To ensure that there is no multicollinearity problem with the non-dummy variables

in this study, this thesis performs the Variance Inflation Factor test (VIF).[46] The VIF test suggests that there is no multicollinearity problem as the VIFs of the regression are below 10. This confirms that there is a less collinearity problem in a panel data compared to time series and cross sectional data (Hsiao, 2003).

4.3 Regression Results

From Chapter 3, the three equations namely Equation (3.3), (3.4) and (3.5) are reproduced below:

$$NPLTA_{i,t} = \beta_0 Y_{NPLTA\ it-1} + \beta_1 POSTDI_{i,t} + \beta_2 FOREIGN_{i,t} + \beta_3 RWCR_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 OVERHEADTA_{i,t} + \beta_6 BKGSYS_{i,t} + error_{i,t} \quad (3.3)$$

$$ZSCORE_{i,t} = \beta_0 Y_{ZSCORE\ it-1} + \beta_1 POSTDI_{i,t} + \beta_2 FOREIGN_{i,t} + \beta_3 RWCR_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 OVERHEADTA_{i,t} + \beta_6 BKGSYS_{i,t} + error_{i,t} \quad (3.4)$$

$$OVERHEADTA_{i,t} = \beta_0 Y_{OVERHEADTA\ it-1} + \beta_1 POSTDI_{i,t} + \beta_2 FOREIGN_{i,t} + \beta_3 RWCR_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 NPLTA_{i,t} + \beta_6 BKGSYS_{i,t} + error_{i,t} \quad (3.5)$$

The set of the variables (dependent variables, explanatory variables and control variables) retains the same definitions as in Chapter 3. Cross section fixed effects are controlled through the first differencing of all variables as required by the System GMM and First-differenced GMM algorithms. Moreover, year dummies have been added to all GMM estimators to remove the general time-related shocks, such as the macroeconomic or seasonality shocks common to all banks from the error term as done by Roodman (2006) and Chernykh and Cole (2011). System GMM estimators use the level of the bank risk

[46] A VIF value of above 10 indicates the problem of multicollinearity (Gujarati & Porter, 2009).

proxies (dependent variables) lagged two periods and earlier to the end of the available time series of the banks as instruments for the change in bank risk; and the estimators use the change of bank risk proxies two periods and earlier to instrument the level of bank risk proxies in the system of equations. Other variables are assumed to be exogenous and hence they instrument themselves. All the GMM models are estimated using the two-step System GMM estimation method (see Hadad et al., 2011) The following is a presentation of the results of the estimation.

4.3.1. Diagnostic Test for GMM

Before presenting the estimation results, three conditions should be satisfied for GMM estimators to be consistent that is: (i) the absence of second order correlation; (ii) the validity of the instruments; and; (iii) the model well fit the data. Section 4.3.1.1 until 4.3.1.3 elaborates the diagnostic tests to ascertain the quality of estimation.

4.3.1.1 Autocorrelation of Residuals (Arellano-Bond Test)

GMM estimators are expected to have first order autocorrelation, but the crucial requirement for GMM estimators to be consistent, is the absence of second order autocorrelation. If the autocorrelation exists, some lags are invalid instruments and should be removed from the instrument set. Arellano and Bond (1991) developed a test for the serial correlation in the disturbance term. Both first and second order autocorrelations are reported in this study. However, the absence of second order autocorrelation is the critical condition that should be satisfied. The Arellano-Bond test specifies that the estimates are consistent if there is no second order autocorrelation.

4.3.1.2 Validity of Instruments (Sargan Test)

For GMM to be valid, instruments must be exogenous. Otherwise, the moment conditions will not be satisfied. A test for the validity of the over-identifying restrictions called the Sargan test is employed in this study. Sargan test is also known as the Hansen test for over identifying restrictions (Hansen, 1982). The null hypothesis for this test is that all the instruments are valid. The above null hypothesis should not be rejected in order to proceed with GMM estimation. The rejection of the null indicates that at least one of the instruments is not valid.

4.3.1.3 The Goodness of Fit (Wald Test)

A Wald test is used for testing the goodness of fit of the model. The Wald test indicates that the model well fits the data. The null hypothesis of this test is that the set of coefficients of the model is simultaneously equal to zero. If the null cannot be rejected, the variables of the GMM model are not doing a good job in predicting the dependent variable. The Wald test uses the chi-square in testing this hypothesis.

4.3.2 Estimation Results for All Banks (Table 4.3)

Table 4.3 reports the significance levels of AR(1) and AR(2) for both models. As expected, AR(1) is significant at the 10% and 1% level, but AR(2) is insignificant for all the columns (a), (b) and (c). Hence, there is no second order autocorrelation. The GMM requirement is satisfied. The null hypothesis that all the instruments are valid under the Sargan test cannot be rejected as presented in Table 4.3. Finally, the Wald test also indicates that the three

models well fit the data. Hence, this study can proceed to estimate the model using GMM dynamic panel regressions.

In Table 4.3, the variable of interest is a dummy variable called POSTDI. POSTDI is equal to one for post deposit insurance period and zero for pre deposit insurance period. The POSTDI coefficient are highly significant at 1% level for all types of bank risk i.e. credit risk, insolvency risk and operational risk as presented in Model 1 till Model 3. The POSTDI coefficients have the expected positive relationship with bank risk specifically insolvency risk and operational risk. After the introduction of the deposit insurance system, it is noted that the banks' risk increase. These results are consistent with previous research (e.g. Chernykh & Cole, 2011 and Ioannidou & Penas, 2010) that banks' exposure to risk taking increased after the implementation of deposit insurance system.

Although the POSTDI coefficients for credit risk differ from the expected (column (a)), the credit risk relationship with POSTDI is still highly significant.[47] The negative coefficient of 0.335 for POSTDI indicates that credit risk decrease by 33.5% after the introduction of deposit insurance system. Comparing the results in Model 1 to Model 3, it can be seen that credit risk decreases[48] while insolvency risk and operational risk increase after the introduction of deposit insurance in a dual banking system like Malaysia.

[47] The result indicates that credit risk reduce significantly after the introduction of deposit insurance. The improvement in credit risk may partly due to the banks' effort in improving their assets / credit management (credit risk) to avoid paying high deposit insurance premium. To reinstate, the risk based deposit insurance premium should penalise bank with higher risk profile to pay higher premium rate.

[48] When replacing the ratio of non-performing loans to total assets with non-performing loans to gross loans, the empirical results change – coefficient of POSTDI is positive and significant. However, the significant level is only at 10% level compared to the 1% level in Model 1 of Table 4.4.

Table 4.3: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking (All banks)

All Banks (Conventional & Islamic banks)	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1 (**a**)	Model 2 (**b**)	Model 3 (**c**)
Constant	8.779*** (1.367)	-89.986*** (14.323)	0.043 (0.114)
Risk $_{i,t-1}$	0.669*** (0.007)	0.197*** (0.017)	0.106*** (0.002)
POSTDI	-0.335*** (0.075)	-14.482*** (1.931)	0.252*** (0.049)
FOREIGN	-0.796** (0.374)	36.511*** (5.551)	0.478*** (0.074)
BANKING SYSTEM	0.103 (0.139)	-6.119* (3.776)	-0.484*** (0.089)
RWCR	-0.014*** (0.002)	-0.026*** (0.041)	-9.46e-06 (0.001)
LOG_ASSET	-0.735*** (0.131)	1.612*** (9.944)	0.092*** (0.013)
OVERHEADTA	-0.133*** (0.035)	9.387*** (1.119)	-
NPLTA			0.047*** (0.005)
Time dummies	Yes	Yes	Yes
Wald test	$Chi^2(13)$=434947.60 (0.0000)***	$Chi^2(13)$=26903.85 (0.0000)***	$Chi^2(13)$=46918.02 (0.0000)***
Sargan test	$Chi^2(32)$=37.916 (0.2175)	$Chi^2(32)$=25.797 (0.7725)	$Chi^2(32)$=28.046 (0.6671)
Arrelano-Bond test for AR(1)	N(0,1)=-1.8256 (0.0679)*	N(0,1)=-2.401 (0.0164)*	N(0,1)=-2.7544 (0.0059)***
Arrelano-Bond test for AR(2)	N(0,2)=0.7884 (0.4304)	N(0,2)=0.7321 (0.4641)	N(0,2)=0.2699 (0.7872)
N	303	305	304

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
BANKINGSYSTEM - A dummy variable that equals to 1=Conventional banks and 0=Islamic banks
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

The result suggests banks increase their risks through insolvency risk (not in credit risk) and operational risk after the introduction of deposit insurance as shown by the negative and significant coefficient of POSTDI with ZSCORE and the positive and significant coefficient of POSTDI with OVERHEADTA. Collectively, moral hazard is present in the Malaysian banks considering that banks increased their exposure to risk after the introduction of deposit insurance. The results support the Hypothesis 1 and Hypothesis 2 in Chapter 3.

With respect to the control variables, such as the ownership of banks, the regulatory pressure/capital buffer, RWCR and bank size, are all significant with the bank risk variables. Further, the BANKING SYSTEM variable in Model 2 and Model 3 suggests that there is a significant difference in the bank risk for the conventional and Islamic banks as both POSTDI coefficients in Model 2 and Model 3 are statistically significant at 10% and 1% respectively. These results confirm that there is a significant difference in bank risk taking between the Islamic banks and conventional banks in the Malaysian banking system after the introduction of deposit insurance. To investigate this relationship, this thesis runs a separate regression (conservative approach rather than using interaction term) for the conventional and Islamic banks. A detailed presentation of the results follows under Sections 4.3.3 and 4.3.4.

4.3.3 Estimation Results for Conventional Banks (Table 4.4)

The primary variable of interest is still POSTDI. The POSTDI variable is used to investigate the risk change in the conventional banks after the introduction of deposit

Table 4.4: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking (Conventional banks)

Conventional banks	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	4.175 (5.848)	-130.107 (51.682)	7.674*** (0.877)
Risk $_{i,t-1}$	0.792*** (0.115)	-0.471*** (0.133)	0.249** (0.104)
POSTDI	1.432 (1.423)	-13.684** (4.359)	0.256*** (0.071)
FOREIGN	-1.344 (1.270)	29.467** (11.728)	-0.7467** (0.305)
RWCR	-0.002 (0.007)	0.113 (0.112)	-0.003** (0.001)
LOG_ASSET	-0.325 (0.448)	12.350* (6.672)	-0.616*** (0.084)
OVERHEADTA	-0.618** (0.311)	10.159 (19.439)	
NPLTA			-0.026* (0.013)
Time dummies	Yes	Yes	Yes
Wald test	$Chi^2(12)=27311.37$ (0.0000)***	$Chi^2(12)=5122.76$ (0.0000)***	$Chi^2(12)=1329.86$ (0.0000)***
Sargan test	$Chi^2(33)=8.673$ (1.0000)	$Chi^2(33)=6.818$ (1.0000)	$Ch^2(33)=8.968$ (1.0000)
Arrelano-Bond test for AR(1)	N(0,1)=-1.4159 (0.1568)	N(0,1)=-3.417 (0.0006)	N(0,1)=-1.9914 (0.0464)**
Arrelano-Bond test for AR(2)	N(0,2)=1.1325 (0.2574)	N(0,2)=0.228 (0.8196)	N(0,2)=1.1257 (0.2603)
N	174	176	175

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

insurance. Hence, the results only estimate the conventional banks' risk change in respect to the introduction of deposit insurance. If the conventional banks increase their bank risk through insolvency risk and operational risk, the POSTDI coefficient will have a negative and positive coefficient with ZSCORE in Model 2 and OVERHEADTA in Model 3 respectively. Model 1, Model 2 and Model 3 of Table 4.4 explore the impact of bank risk for the conventional banks after the introduction of deposit insurance system.

From Table 4.4, the System GMM is significant (Wald test) and consistent as there is no second order serial correlation and the instruments introduced in the model are valid (Sargan test). The coefficient of the variable of interest-POSTDI is statistically significant at the 1% level and have a positive relationship with bank risk. The POSTDI coefficient is -13.684 and 0.256 for insolvency risk and operational risk respectively. The results as shown in Table 4.4, indicate that there is a significant increase in bank risk through insolvency risk and operational risk in the conventional banks after the introduction of deposit insurance system. On the contrary, there is no increase in risk taking in the form of credit risk and this is consistent with results of the study by Tuan, Ying, and Nya (2010). The overall result is consistent with the moral hazard hypothesis that banks have the incentive to increase risk, as they know that the insurance protection will provide a buffer for the downside uncertainties. The result of this study is similar to the results of current studies that banks are more likely to undertake higher risk after the introduction of deposit insurance.[49] Unlike Chernykh and Cole (2011), this study provides statistically strong evidence that operational risk increases in the conventional banks after the introduction of deposit insurance system.

[49] See for example Chernykh and Cole (2011) and Ioannidou and Penas (2010).

Turning to the control variables, this study finds that the conventional foreign banks and large banks are more stable and good operational risk management practices. The regulatory pressure variable, RWCR does not enter significantly in Model 1 and Model 2 regressions. These results support the Hypothesis 4 and Hypothesis 5 in Chapter 3. Overall, these results confirm the hypothesis that the deposit insurance system causes moral hazard problem in the conventional banks through an increase in risk taking.

4.3.4 Estimation Results for Islamic Banks (Table 4.5)

Table 4.5 shows the effect of deposit insurance on Islamic banks risk taking after the introduction of deposit insurance. Interestingly, the results reported in Table 4.4 for the conventional banks differ from the Islamic banks. Table 4.5 suggests that the moral hazard problem is not present in the Islamic banks. In addition, the models satisfy all the three system GMM estimator conditions as discussed under Section 4.3.1.

The POSTDI coefficients are not statistically significant with all the three variables of bank risks i.e. NPLTA, ZSCORE and OVERHEADTA. As the lagged bank risk variables ($Risk_{i,t-1}$) are also not significant and this further indicates that there is no dynamic change of bank risk in the Islamic banks after the introduction of deposit insurance. The implications of the introduction of deposit insurance system on the Islamic banks have not been studied before. Understanding the theoretical underpinnings of Islamic finance/banking will provide us with some grounds to extrapolate the results.

Table 4.5: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking (Islamic banks)

Islamic banks	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	7.727** (1.367)	21.969 (274.255)	0.222 (2.943)
Risk $_{i,t-1}$	0.212 (0.514)	-0.376 (0.027)	0.122 (0.089)
POSTDI	-2.540 (2.111)	-17.359 (26.121)	0.210 (0.242)
FOREIGN	-0.936 (9.393)	245.002 (311.761)	1.476 (1.432)
RWCR	0.010 (0.014)	0.002 (0.246)	-0.003 (0.003)
LOG_ASSET	-0.491 (0.681)	-15.931 (20.469)	-0.012 (0.337)
OVERHEADTA	-0.118 (0.394)	-24.076 (17.687)	-
NPLTA			-0.0076 (0.040)
Time dummies	Yes	Yes	Yes
Wald test	$Chi^2(14)=2203.53$ (0.000)***	$Chi^2(14)=429.11$ (0.0000)***	$Chi^2(14)=97.99$ (0.0000)***
Sargan test	$Chi^2(33)=2.558$ (1.0000)	$Chi^2(33)=4.4574$ (1.0000)	$Chi^2(33)=5.191$ (0.6671)
Arrelano-Bond test for AR(1)	N(0,1)=-0.3536 (0.7236)	N(0,1)=0.6023 (0.5470)	N(0,1)=-0.7043 (0.4812)
Arrelano-Bond test for AR(2)	N(0,2)=0.2241 (0.8227)	N(0,2)=-0.996 (0.3192)	N(0,2)=0.8504 (0.3951)
N	129	129	129

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

Malaysia plays a leading role in promoting the Islamic finance industry. The Islamic banking asset in Malaysia captured a 20% market share in 2010 since its inception in 1983. Further, total Islamic banking deposits stood at RM188.8 billion which comprise 19.3% of the total deposits.[50] The aftermath of the recent financial crises has shown that both the conventional banks and the Islamic banks have been affected. On the other hand, the Islamic banks have been credited for their resilience performance due to the intrinsic strength of the Islamic banking.[51] Hence, the intrinsic values attributed to this resilience such as the restrictions on the use of leverage and speculation, less exposure to toxic assets through collateralized debt obligations and mortgage backed securities has indeed prevented the Islamic banks from escalating their exposure to risk unlike the conventional banks after the introduction of deposit insurance system.

From an agency framework, moral hazard may also present in Islamic banks. However, reminiscent of the results in Table 4.5 which indicate the ethical financing under the *Shariah* principles guide the operating principles of the Islamic banks and restrict the inclination towards riskier business that are prohibited by the *Shariah*. In addition, the contractual framework under the Islamic banking requires banks to be diligent in risk management as the banks share profit and loss in an investment. Although *Mudarabah* financing is minimal in Malaysia, the profit of an investment is shared between banks and customers (borrowers). Thus, as capital provider, the banks bear the risk of loss on the investments if the borrowers have exercised scant due diligence in the conduct of their business leading the Islamic banks to be prudent in their risk management. The results of this study show that the Islamic banks are reasonably cautious to increase bank risk taking even in the presence of deposit protection. In the same vein, Hassan (2009) suggests that

[50] Bank Negara Malaysia, Financial Stability and Payment Systems Report, 2010
[51] Islamic Finance and Global Financial Stability Report, Islamic Financial Services Board 2010

the Islamic banks are active in managing risk. Malaysia is the only country that provides deposit insurance for all Islamic deposits including profit sharing investment account (PSIA) for the members' banks. In other jurisdictions that provide deposit insurance, coverage excludes PSIA due to its nature that prohibits any guarantee on its principle and profit. Thus, the Malaysian data provides an unbiased comparative ground between conventional and Islamic banks.

The bank risks and deposit insurance in the three models in Table 4.5 are not statistically significant. The introduction of deposit insurance does not alter the Islamic banks' exposure to risk. Thus, the results cannot support Hypothesis 5 and Hypothesis 6 as there is no change in bank risk in the form of financial and operational risk in the Islamic banks after the introduction of deposit insurance. Comparing the results presented in the conventional and Islamic banks, the findings indicate that there is a difference in bank risk taking between the Islamic banks and conventional banks after the introduction of the deposit insurance system.

4.3.5 Robustness Checks

This study offers robustness tests to illustrate that the above results are robust. I am concerned that the results of this study may be driven by the effect of bank risk variables. Therefore, the risk factors namely the NPLTA and OVERHEADTA are excluded from the models. Again, all the models satisfy the three System GMM estimator conditions as discussed under Section 4.3.1 whereby there is no second order autocorrelation, the instruments used are valid and the models well fit the data. Tables 4.6, 4.7 and 4.8 show the

estimation results of the equation excluding the risk factors from the model. These results obtained are qualitatively similar to the main results in Tables 4.3, 4.4 and 4.5.

To ensure that there is no linear association between POSTDI and the time dummies[52], this thesis exclude the time dummies from the estimation models. Table 4.9 until Table 4.11 is the estimation results for the equation excluding time dummies and risk factors. Generally, the results obtained are similar to the main results.[53]

[52] A linear association between the time dummies variable and POSTDI can lead to multicollinearity problem.

[53] When the time dummies are excluded from the model (see Table 4.11), operational risk is present in the Islamic banks after the introduction of deposit insurance. However, there is no increase in financial risk for the Islamic banks. Thus, generally Islamic banks do not increase risk after the introduction of deposit insurance.

Table 4.6: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking - Risk Factor Not Controlled (All banks)

All Banks (Conventional & Islamic banks)	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	7.953*** (1.214)	-54.869*** (20.278)	-0.279* (0.172)
Risk $_{i,t-1}$	0.664*** (0.008)	0.223*** (0.021)	0.106*** (0.003)
POSTDI	-0.429*** (0.079)	-13.014*** (1.657)	0.201*** (0.041)
FOREIGN	-0.589** (0.302)	36.351*** (4.280)	0.432*** (0.113)
BANKING SYSTEM	-0.014 (0.134)	-3.560 (2.744)	-0.487*** (0.065)
RWCR	-0.014*** (0.014)	-0.062 (0.044)	0.0002 (0.0007)
LOG_ASSET	-0.659*** (0.119)	7.475*** (2.290)	0.143*** (0.015)
Time dummies	Yes	Yes	Yes
Wald test	$Chi^2(12)$=180e+06 (0.000)***	$Chi^2(12)$=13346.01 (0.0000)***	$Chi^2(12)$=35306.74 (0.0000)***
Sargan test	$Chi^2(32)$=38.260 (0.2064)	$Chi^2(32)$=31.334 (0.5001)	$Chi^2(32)$=30.5889 (0.5380)
Arrelano-Bond test for AR(1)	N(0,1)=-1.8347 (0.0665)	N(0,1)=-2.4174 (0.0156)	N(0,1)=-2.6278 (0.0086)
Arrelano-Bond test for AR(2)	N(0,2)=0.7972 (0.4253)	N(0,2)=0.6250 (0.5320)	N(0,2)=0.2492 (0.8032)
N	303	305	304

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
BANKINGSYSTEM - A dummy variable that equals to 1=Conventional banks and 0=Islamic banks
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

Table 4.7: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking - Risk Factor Not Controlled (Conventional banks)

Conventional Banks	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	3.243 (6.920)	-145.317*** (50.375)	7.414*** (0.959)
Risk $_{i,t-1}$	0.710*** (0.103)	0.4800*** (0.110)	0.063 (0.128)
POSTDI	0.297 (1.251)	-14.388*** (4.179)	0.267*** (0.073)
FOREIGN	-1.349 (1.133)	26.768*** (10.048)	-0.573** (0.314)
RWCR	-0.005 (0.008)	0.164** (0.068)	-0.006*** (0.001)
LOG_ASSET	-0.213 (0.576)	15.439*** (4.979)	-0.581*** (0.088)
Time dummies	Yes	Yes	Yes
Wald test	$Chi^2(11)=14368.91$ (0.000)***	$Chi^2(11)=3456.07$ (0.0000)***	$Chi^2(11)=1757.28$ (0.0000)***
Sargan test	$Chi^2(33)=11.8808$ (0.9997)	$Chi^2(33)=6.929$ (1.0000)	$Chi^2(33)=10.244$ (1.0000)
Arrelano-Bond test for AR(1)	N(0,1)=-1.2314 (0.2182)	N(0,1)=-3.5397 (0.0004)	N(0,1)=-2.3005 (0.0214)
Arrelano-Bond test for AR(2)	N(0,2)=1.0015 (0.3166)	N(0,2)=0.1612 (0.8720)	N(0,2)=1.3306 (0.1833)
N	174	176	175

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

Table 4.8: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking - Risk Factor Not Controlled (Islamic banks)

Islamic Banks	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	26.162*** (9.931)	316.336* (179.946)	0.6247 (1.038)
Risk $_{i,t-1}$	0.613*** (0.111)	-0.242 (0.263)	0.086*** (0.015)
POSTDI	0.590 (0.677)	12.592 (14.599)	0.079 (0.278)
FOREIGN	-4.512 (3.109)	-153.711 (124.966)	2.121 (1.694)
RWCR	-0.022** (0.009)	-0.103 (0.235)	-0.002 (0.002)
LOG_ASSET	-2.828** (1.180)	-30.937* (17.851)	-0.065 (0.116)
Time dummies	Yes	Yes	Yes
Wald test	$Chi^2(13)=3731.70$ (0.000)***	$Chi^2(13)=450.04$ (0.0000)***	$Chi^2(13)=12632.79$ (0.0000)***
Sargan test	$Chi^2(33)=2.393$ (1.000)	$Chi^2(33)=6.4056$ (1.000)	$Chi^2(33)=2.7485$ (1.000)
Arrelano-Bond test for AR(1)	N(0,1)=-1.544 (0.123)	N(0,1)=-0.025 (0.9801)	N(0,1)=-0.7045 (0.4811)
Arrelano-Bond test for AR(2)	N(0,2)=-0.074 (0.9412)	N(0,2)=-1.1545 (0.2483)	N(0,2)=-0.1732 (0.8625)
N	129	129	129

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

Table 4.9: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking – Excluding Time Dummies (All banks)

All Banks (Conventional & Islamic banks)	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	10.163*** (1.175)	-24.994** (11.280)	0.874*** (0.064)
Risk $_{i,t-1}$	0.585*** (0.009)	0.291*** (0.009)	0.088*** (0.0007)
POSTDI	-0.261*** (0.019)	-4.368*** (0.372)	0.075** (0.026)
FOREIGN	-1.244*** (0.197)	30.097*** (4.824)	0.350*** (0.083)
BANKING SYSTEM	-0.126 (0.101)	-0.242 (2.886)	-0.419*** (0.059)
RWCR	-0.011*** (0.001)	-0.024 (0.034)	-0.001* (0.0003)
LOG_ASSET	-0.851*** (0.100)	2.873** (1.251)	0.021*** (0.004)
OVERHEADTA	-0.218*** (0.035)	6.835*** (0.515)	
NPLASSET			0.026*** (0.002)
Wald test	$Chi^2(7)$=1.37e+06 (0.000)***	$Chi^2(7)$=594179.62 (0.0000)***	$Chi^2(7)$= 1.13e+06 (0.0000)***
Sargan test	$Chi^2(32)$=33.767 (0.3821)	$Chi^2(32)$=32.946 (0.4206)	$Chi^2(32)$=31.474 (0.4931)
Arrelano-Bond test for AR(1)	N(0,1)= -1.721 (0.0853)*	N(0,1)=-2.403 (0.0163)**	N(0,1)=-2.6487 (0.0081)***
Arrelano-Bond test for AR(2)	N(0,2)=0.732 (0.464)	N(0,2)=0.947 (0.3434)	N(0,2)= 0.2584 (0.7961)
N	303	305	304

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
BANKINGSYSTEM - A dummy variable that equals to 1=Conventional banks and 0=Islamic banks
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

Table 4.10: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking – Excluding Time Dummies (Conventional banks)

All Banks (Conventional & Islamic banks)	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	18.568*** (2.755)	-98.041** (38.756)	6.150*** (0.620)
Risk $_{i,t-1}$	0.522*** (0.013)	0.419*** (0.031)	0.158** (0.073)
POSTDI	-0.447*** (0.092)	-7.634*** (1.599)	0.054** (0.022)
FOREIGN	-5.361*** (0.459)	33.779*** (6.571)	-0.372* (0.194)
RWCR	-0.004 (0.003)	0.034 (0.076)	-0.003*** (0.001)
LOG_ASSET	-1.238*** (0.232)	9.282** (3.991)	-0.464*** (0.055)
OVERHEADTA	-1.562*** (0.214)	8.418** (4.984)	
NPLASSET			-0.037*** (0.005)
Wald test	$Chi^2(5)$=119042.50 (0.000)***	$Chi^2(6)$=1199.05 (0.0000)***	$Chi^2(6)$=4346.74 (0.0000)***
Sargan test	$Chi^2(33)$=19.752 (0.9668)	$Chi^2(33)$=17.820 (0.9855)	$Chi^2(33)$=12.994 (0.9993)
Arrelano-Bond test for AR(1)	N(0,1)=-1.212 (0.2255)	N(0,1)=-3.4838 (0.0005)***	N(0,1)=-1.9769 (0.0480)**
Arrelano-Bond test for AR(2)	N(0,2)=0.978 (0.3277)	N(0,2)=0.754 (0.4506)	N(0,2)=1.064 (0.2872)
N	174	176	175

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

Table 4.11: System GMM Estimation Results for the Effect of Deposit Insurance on Bank Risk Taking – Excluding Time Dummies (Islamic banks)

All Banks (Conventional & Islamic banks)	Dependent variable (Expected sign with POSTDI)		
	NPLTA (+)	ZSCORE (-)	OVERHEADTA (+)
	Model 1	Model 2	Model 3
Constant	1.745* (1.001)	64.418*** (18.175)	0.259 (0.747)
Risk $_{i,t-1}$	0.750*** (0.027)	0.209*** (0.029)	0.075** (0.031)
POSTDI	-0.535** (0.234)	-2.600 (5.627)	0.456*** (0.099)
FOREIGN	1.503*** (0.354)	-25.265*** (4.748)	0.602*** (0.218)
RWCR	-0.002 (0.006)	-0.104 (0.072)	-0.003* (0.001)
LOG_ASSET	-0.182* (0.109)	-5.143*** (1.930)	0.003 (0.092)
OVERHEADTA	0.117 (0.193)	4.298 3.160	
NPLASSET			0.072*** (0.014)
Wald test	$Chi^2(6)$=8054.71 (0.000)***	$Chi^2(6)$=1427.43 (0.0000)***	$Chi^2(6)$=416.79 (0.0000)***
Sargan test	$Chi^2(33)$=8.936 (1.000)	$Chi^2(33)$= 12.128 (0.9997)	$Chi^2(33)$=12.823 (0.9994)
Arrelano-Bond test for AR(1)	N(0,1)=-1.828 (0.0675)*	N(0,1)=-1.549 (0.1212)	N(0,1)=-2.163 (0.031)**
Arrelano-Bond test for AR(2)	N(0,2)=-0.213 (0.8312)	N(0,2)=0.618 (0.5362)	N(0,2)=-0.425 (0.6707)
N	129	129	129

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
POSTDI - A dummy variable that equals to 1=Post-deposit insurance and 0=Pre-deposit insurance
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

4.4 Summary

This chapter discussed the relationship between deposit insurance and bank risk taking for both the conventional and Islamic banks using panel data research design. The data of this research consists of all the conventional and Islamic banks in Malaysia for the period 2002-2010, which were subjected to certain criteria to reduce the effects of outliers. This thesis employs the dynamic panel data specification, precisely the System GMM of Blundell and Bond (1998) to estimate the parameters as the dynamic panel is an unbiased, precise and efficient estimator particularly in solving the endogeneity problem in a panel data model (Baltagi, 2005). Several specification tests namely the Arrelano-Bond test, Sargan test and Wald test were conducted to satisfy with the GMM requirement. Furthermore as an alternative check for robustness, the risk factors namely the NPLTA and OVERHEADTA were excluded from the models. Similar qualitative results were reported. Therefore, the results are robust.

All the results in this chapter generally support a statistically significant relationship between bank risk (moral hazard problem) and the introduction of deposit insurance. Specifically, for a dual banking system like Malaysia, the moral hazard problem is prevalent in the conventional banks. On the contrary, the panel data estimates indicate that the moral hazard problem by way of an increase in risk taking is not present in the Islamic banks. Therefore, the results of this thesis are consistent with findings of existing studies that the conventional banks increase risk taking including new empirical evidence on operational risk taking after the introduction of deposit insurance. In addition, it provides new insights on the different implication of deposit insurance on the Islamic banks' risk taking.

Chapter 5 : Risk-Premium Sensitivity and Bank Risk

5.0 Introduction

In the previous chapter, this thesis examined the problem of moral hazard in the conventional and Islamic banks in Malaysia. The findings indicate that the problem of moral hazard by way of increased bank risk taking is significant after the introduction of deposit insurance in a dual banking system like Malaysia but is limited to the conventional banks through insolvency risk and operational risk. This leads to the examination of the final objective of this thesis whether the insurance premium is sensitive towards bank risks in the risk-based premium system and able to mitigate this moral hazard problem after the implementation of deposit insurance system.

At this juncture, there is no country specific study that investigates whether the premium sensitivity improves in the risk-based premium assessment method and whether the magnitude of the annual premium paid is positively associated with bank risk under a deposit insurance. There are a few cross-country empirical studies, but these studies employ dummy variables instead of estimating the annual premiums. Literature suggests that the risk-based premium method will mitigate the moral hazard problem (see for example Cull, Senbet, & Sorge, 2005; Demirguc-Kunt & Detragiache, 2002; Demirguc-Kunt & Huizinga, 2004). However, none of the country specific empirical studies in the deposit insurance literature (see Chernykh & Cole, 2011; Hadad et al., 2011; Ioannidou & Penas, 2010) have thus far examined the sensitivity of deposit insurance premium towards bank risk in the risk-based premium system as these countries (Russia, Indonesia and Bolivia) continue to adopt the flat rate insurance premium until today. On the contrary,

Malaysia migrated from the flat rate premium to the risk based premium scheme in the year 2008.

This study is distinct from current studies as it not only investigates whether the risk-premium sensitivity under the risk-based premium improves but also the correlation between the magnitude of the annual premium paid to bank risks. This thesis first estimates the annual insurance premiums paid by adapting the MDIC methodology as discussed in detail in Section 3.2.3. Thereafter, the sensitivity between bank risk and the insurance premium system in a risk-based premium assessment method is investigated using the dynamic panel regression specifically the System GMM.

The remainder of this chapter is organized as follows. The correlation structure is presented in Section 5.1. The empirical findings of the System GMM regression results are presented in Section 5.2. The summary of the chapter is presented in Section 5.3.

5.1 Correlation Structure

Table 5.1: The Pairwise Correlation Matrix for Dependent Variables (NPL, ZSCORE & OVERHEADTA) and Explanatory Non-dummy Variables

	NPL	ZSCORE	OPRISK	PREMIUM	SIZE	RWCR
NPL	1.000					
ZSCORE	0.055 (0.434)	1.000				
OPRISK	0.024 (0.735)	-0.031 (0.659)	1.000			
PREMIUM	0.221*** (0.002)	0.141** (0.046)	-0.013 (0.855)	1.000		
SIZE	0.341*** (0.000)	0.441*** (0.000)	-0.119 (0.093)	0.704*** (0.000)	1.000	
RWCR	-0.257*** (0.000)	-0.221*** (0.000)	0.398*** (0.000)	-0.186*** (0.008)	-0.503*** (0.000)	1.000

Note: This table presents the correlation results.
The p-value is in parentheses. *, **and *** indicates significant at the 10%, 5% and 1% level respectively.
NPL - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OPRISK - Ratio of overhead expenses to bank asset (proxy for operational risk)
PREMIUM - Estimated annual insurance premium
SIZE - Log of total assets
RWCR - The risk weighted capital adequacy ratio

Table 5.1 above reports the Pearson pairwise correlation coefficient for all banks over the deposit insurance establishment period 2006-2010. Although the correlation coefficients are low but some of the correlations are statistically significant. The correlations indicate NPL is significantly correlated with the PREMIUM (0.221), SIZE (0.341) and the RWCR (-0.257). Similarly, the second dependent variable, ZSCORE is significantly correlated with the PREMIUM, SIZE and RWCR. The third dependent variable, OPRISK is statistically significant with RWCR (0.398). The qualitative results are similar to the correlation structure for the full period reported in Table 4.2.

The correlation coefficients among the explanatory variables are low but are statistically significant. Consistent with the results in Table 4.2, there is a strong and significant

correlation (0.704) between PREMIUM and SIZE. To ensure that there is no multicollinearity problem with the non-dummy variables in this study, this thesis performed the Variance Inflation Factor test (VIF).[54] The VIF test suggests that there is no multicollinearity problem as the VIFs of the regression are below 10. This confirms that there is a less collinearity problem in a panel data compared to time series and cross sectional data (Hsiao, 2003).

5.2 Regression Results

The set of the variables (dependent variables, explanatory variables and control variables) retains the same definitions as in Chapter 3. From Chapter 3, the three equations that are Equation (3.24), (3.25) and (3.26) are reproduced here:

$$NPLTA_{i,t} = \beta_0 Y_{NPLTAi,t-1} + \beta_1 RISKBASED_{i,t} + \beta_2 PREMIUM_{i,t} + \beta_3 RISKBASEDxPREMIUM_{i,} + \beta_4 FOREIGN_{i,t} + \beta_5 RWCR_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SIZExPREMIUM_{i,t} + error_{i,t} \quad (3.24)$$

$$ZSCORE_{i,t} = \beta_0 Y_{ZSCOREi,t-1} + \beta_1 RISKBASED_{i,t} + \beta_2 PREMIUM_{i,t} + \beta_3 RISKBASEDxPREMIUM_{i,} + \beta_4 FOREIGN_{i,t} + \beta_5 RWCR_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SIZExPREMIUM_{i,t} + error_{i,t} \quad (3.25)$$

$$OVERHEADTA_{i,t} = \beta_0 Y_{OVERHEADTAi,t-1} + \beta_1 RISKBASED_{i,t} + \beta_2 PREMIUM_{i,t} + \beta_3 RISKBASEDxPREMIUM_{i,} + \beta_4 FOREIGN_{i,t} + \beta_5 RWCR_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SIZExPREMIUM_{i,t} + error_{i,t} \quad (3.26)$$

[54] A VIF value of above 10 indicates the problem of multicollinearity (Gujarati & Porter, 2009).

Table 5.2 presents the descriptive statistics of the regression variables. Overall, the banks have paid an average of RM2.45 million of annual premiums over the period 2006-2010. The maximum annual premium paid was RM25.32 million whilst the minimum was RM250,000 which is also the minimum mandatory premium stipulated by MDIC. The median bank in the sample that paid RM463,000 in annual premium, had a non-performing loan of 1.34%, a risk index of 18.34, a ratio of total expenses to asset of 1.25% and a risk weighted capital adequacy ratio of 15%.

Table 5.2: Descriptive Statistics of Dependent and Non-Dummy Explanatory Non-Dummy Variables Post Deposit Insurance

	N (bank years)	Mean	Median	Std. Dev	Min	Max
NPLTA	200	2.045	1.34	2.274	0	15.93
ZSCORE	200	28.596	18.346	31.136	-26.137	136.02
OVERHEADTA	200	1.406	1.25	2.098	0.05	29.64
PREMIUM	200	2.453	0.463	4.221	0.25	25.324
RWCR	200	23.079	15	26.638	-2.84	211.92
SIZE	200	9.461	9.315	1.421	5.675	12.423

Note:
NPLTA Ratio of non-performing loans to bank asset
ZSCORE The risk index
OVERHEADTA Ratio of overhead expenses to bank asset
PREMIUM Annual premium in RM
RWCR Risk weighted capital adequacy ratio
SIZE The log total assets

This section presents the results of three regressions for each three different dependent variables: result of credit risk, NPLTA; for insolvency risk, ZSCORE and operational risk, OVERHEADTA. In each regression, the study examined whether the risk-premium sensitivity improved in the risk-based premium assessment method and whether the magnitude of the annual premium paid is associated with bank risk and insurance premium. The correlation structure in Table 5.1 and Table 4.2 reported that there is a strong and significant correlation (0.704) between PREMIUM and SIZE. As a result, to control the sensitivity of size on the estimated insurance premium, the study interacted the deposit insurance annual premium with bank size. In addition, the deposit insurance premium was interacted to the risk-based variable to examine the sensitivity of annual premium in the risk-based deposit insurance system with bank risk. Thus, this study includes the two interactions, interacting the annual premium with bank size and interacting the annual premium with the risk-based premium. A series of other control variables are also included in this study. The control variables are dummies for foreign bank as opposed to local banks and time dummies to control for macroeconomic effects. This study also controls bank size and regulatory pressure as measured by the natural logarithm of total assets and risk weighted capital adequacy ratio respectively.

Table 5.3 reports the significance levels of AR(1) and AR(2) for both models. AR(1) is significant at the 10% and 5% level, but AR(2) is insignificant for all the columns (a), (b) and (c). Hence, there is no second order autocorrelation. The null hypothesis that all the instruments are valid under the Sargan test cannot be rejected as presented in Table 5.3. Finally, the Wald test also indicates that the three models well fit the data. Hence, the GMM requirement is satisfied.

Table 5.3: System GMM Estimation Results on the Risk-Premium Sensitivity and Bank Risk

All Banks (Post deposit insurance)	Dependent variable		
	NPLTA	ZSCORE	OVERHEADTA
	Model 1 (**a**)	Model 2 (**b**)	Model 3 (**c**)
Constant	13.274*** (4.738)	-63.417 (69.241)	6.418*** (1.509)
Risk $_{i,t-1}$	0.853*** (0.036)	0.248*** (0.076)	0.066*** (0.003)
RISKBASED	0.769*** (0.203)	-4.899 (4.483)	0.262*** (0.089)
PREMIUM	-1.953*** (0.647)	34.596*** (9.774)	-0.145 (0.151)
PREMIUM x RISKBASED	-0.03*** (0.014)	0.271 (0.398)	0.002 (0.008)
PREMIUM x LOG_ASSET	0.165*** (0.056)	-3.010*** (0.840)	0.012 (0.012)
FOREIGN	-2.367** (1.191)	104.417*** (26.927)	1.387** (0.623)
RWCR	-0.0003 (0.001)	-0.031 (0.036)	-0.001 (0.001)
LOG_ASSET	-1.269*** (0.437)	3.463 (7.716)	-0.627*** (0.157)
Time dummies	Yes	Yes	Yes
Wald test	$Chi^2(10)$=1574.39 (0.0000)***	$Chi^2(10)$=77.39 (0.0000)***	$Chi^2(10)$=6301.81 (0.0000)***
Sargan test	$Chi^2(7)$=4.8027 (0.6840)	$Chi^2(7)$=7.2180 (0.4065)	$Chi^2(7)$=5.6230 (0.5836)
Arrelano-Bond test for AR(1)	N(0,1)=-1.773 (0.0762)*	N(0,1)=-2.515 (0.0119)*	N(0,1)=-2.1968 (0.0280)**
Arrelano-Bond test for AR(2)	N(0,2)=0.453 (0.650)	N(0,2)=0.1312 (0.7211)	N(0,2)=0.1491 (0.8814)
N	160	160	160

Note: This table presents the results from the two-step System Generalized Method of Moments estimations using STATA. The coefficients and standard errors (in parentheses). The Wald, Sargan and Arellano-Bond tests are the post-estimation test to check the appropriateness of the model (in parentheses is the p-value). *, **and *** indicates significant at the 10%, 5% and 1% level respectively.

NPLTA - Ratio of non-performing loans to bank asset (proxy for credit risk)
ZSCORE - The risk index (proxy for insolvency risk)
OVERHEADTA - Ratio of overhead to total assets (proxy for operational risk)
RISKBASED - A dummy variable that equals to 1=Risk-based premium and 0=Flat rate premium
PREMIUM - Estimated annual insurance premium
PREMIUMxRISKBASED - Interaction term between the variable PREMIUM and RISKBASED
PREMIUMxLOG_ASSET - Interactiin term between the variable PREMIUM and LOG_ASSET
FOREIGN - A dummy variable that equals to 1=Foreign bank and 0= Local bank
LOG_ASSET - Log of total assets (bank size)
RWCR - The risk weighted capital adequacy ratio

In Table 5.3, this thesis presents the results from the System GMM regression which analyzes the sensitivity of the bank risk to insurance premium in the risk-based insurance premium. The primary variables of interest are the risk-based premium assessment method, RISKBASED; the estimated annual premium paid, PREMIUM and the interaction term, PREMIUMxRISKBASED.

The coefficient for the level variable of interest, RISKBASED is aimed at capturing the change in bank risk under different premium assessment methods in a deposit insurance system. The RISKBASED is a dummy variable that equals to one for the risk-based premium and zero for the flat rate premium. The coefficient is 0.769 and it is significant at the 1% level. This indicates that, in the risk-based deposit insurance system, the banks' risk are higher than in the flat rate deposit insurance system. In the risk-based system, banks' credit risk increase by 76.9% while operational risk increase by 26.2%.

Next variable of interest is the annual premium paid, PREMIUM. The objective of this variable is to identify whether the premium is adequate to cover for the increase in bank risk. The PREMIUM variable is the estimated annual premium in RM million. This variable tests Hypothesis 8 of this study. The operational risk coefficient is not significant but the PREMIUM coefficient is significant at 1% level for the dependent variable NPLTA (credit risk) and ZSCORE (insolvency risk). The PREMIUM coefficient is -1.953 and is statistically significant at 1% level for credit risk while the insolvency risk is significant at 1% level with a positive coefficient (34.569). Generally, these results report that the annual premium has a negative relationship with the bank risk. When there is an escalation in risk, the premium is inadequate to cover the increase in risk while if there is reduction in risk, it is adequately covered. For example, the annual premium would decrease by RM1.953

million for a RM1 million increase in bank's credit risk (Model 1). On the other hand, the annual premium could adequately cover by RM1.953 million for a RM1 million reduction in bank's credit risk. The PREMIUM variable suggests that when there is a reduction in risk, the banks still pay adequate annual premiums. However, when there is an increase in risk, the annual premium is inadequate to cover the increase in risk. Although the results for the relationship between the annual premium and risk are significant, the direction is negative or inversely related. The result fails to support Hypothesis 8 that the magnitude of the annual premium paid is positively associated with the bank risk.

The final variable of interest is the interaction variable PREMIUM x RISKBASED. The purpose of this variable is to probe whether the risk-premium sensitivity improves in the risk-based deposit insurance system. The variable PREMIUM in RM million is interacted with the RISKBASED dummy variable (1=risk-based premium; 0=flat rate premium). This interaction variable tests Hypothesis 7. The coefficient for PREMIUM x RISKBASED is only significant with credit risk in Model 1. The coefficient is -0.03 and is significant at the 1% level. The negative coefficient indicates that the risk-based premium is inadequate to cover for the increased bank risk, since if there is increase in risk, there would be a drop in the annual premium. Given that, in the risk-based deposit insurance system, the premium is more inadequate compared to the flat rate deposit insurance system. This suggests that banks have the incentives to increase risk (moral hazard problem) in the risk-based deposit insurance premium system, as despite incurring higher risk, the premiums paid are lower than their risk profiles. Indirectly, the results explain why there exists a moral hazard problem in the first place after the introduction of deposit insurance system in Malaysia. In this instance, the risk-based deposit insurance system is an ineffective policy because there is no improvement in the risk-premium sensitivity in the

risk-based premium method. Therefore, these results do not support Hypothesis 7. Taken together, although the risk-based deposit insurance premium is sensitive towards bank risk, the relationship is in the inverse, suggesting that the current design of the risk-based deposit insurance premium policy is not effective to mitigate the moral hazard problem.

The first control variable, LOG_ASSET controls for the bank size. The coefficient for LOG_ASSET shows a negative and significant relation with NPLTA and OVERHEADTA in Models 1 and 3 but insignificant relations with ZSCORE in Model 2. This indicates that the small banks have higher credit risk and operational risk after the introduction of deposit insurance system. The coefficient for the next control variable – PREMIUM x LOG_ASSET is statistically significant at 1% level with bank risk through credit risk (NPLTA) and insolvency risk (ZSCORE). The PREMIUM x LOG_ASSET coefficient for dependent variable NPLTA is significant and positive at the 1% level while the coefficient is negative and significant at 1% level for ZSCORE. The results indicate that bank size matters in determining the annual deposit insurance premiums paid by the banks. As risk increases in larger banks, these banks also pay adequate premiums. On the contrary, the premiums paid by the smaller banks are less adequate to cover risk compared to the larger banks. Hence, the larger bank are more adequately covered and they have less moral hazard problem than the small bank.

The control variable for ownership, FOREIGN is significant in all models revealing that the foreign banks are better than the local banks in managing credit and insolvency risk. However, local banks have better operational risk management than the foreign banks. Finally, the regulatory variable, RWCR is not significant in any regressions and may partially imply that the bank risk taking in a deposit insurance system is not significantly affected by regulatory pressure.

5.3 Summary

In this chapter, the risk-premium sensitivity in the risk-based premium assessment method is first investigated. The thesis offers an alternative measure to investigate the effectiveness of the deposit insurance policy by estimating the annual deposit insurance premium. The risk-premium is found to be significantly inadequate in the risk-based premium assessment method with the annual premium significantly worsen in the risk-based premium system and the magnitude of the annual premium paid is negatively associated with bank risk.

Therefore, the results are robust to conclude that the current risk-based deposit insurance system in Malaysia is ineffective in mitigating the moral hazard problem. This indicates that the effectiveness of the current Malaysian risk-based deposit insurance premium policy to mitigate the moral hazard problem is debatable. However, the results in this chapter do not imply that the risk-based premium method is an ineffective tool to mitigate the moral hazard problem. The results in this chapter merely demonstrate that the risk-based deposit insurance system in Malaysia needs to be fine-tuned further so that the premium is sensitive towards bank risk particularly with the small conventional banks.

Chapter 6 : Conclusions, Implications and Future Research

6.1 Introduction

In confronting information asymmetries and adverse selections, it is vital to provide protection for small depositors who are likely to cause a bank run (Dewatripont & Tirole, 1994). These small depositors cannot correctly assess the risks they take when depositing their savings in a particular bank and neither have the incentive to monitor banks. International bodies such as the World Bank and International Monetary Fund have acknowledged the importance of deposit insurance system. In fact, on 18 June 2008, the Basel Committee on Banking Supervision and the International Association of Deposit Insurers jointly issued a voluntary framework for effective deposit insurance practices known as the *Core Principles for Effective Deposit Insurance System* to encourage more countries to adopt a formal deposit insurance system as mark of financial stability.

Nevertheless, like any other insurance, the deposit insurance system creates moral hazard to the banks as they increase their risk taking as they are somewhat free of the consequences of their actions. As evidenced in the recent bank crisis, taxpayers' money was used to bail out the banks in many countries. Thus, regulators must step into the shoes of depositors to control this moral hazard problem especially in the conventional banks. The moral hazard problem created by the introduction of deposit insurance could be minimized by ensuring credible design features[55] that includes an insurance premium system that is sensitive to the risks profiles of the banks. More specifically, a risk-based insurance premium would mitigate the moral hazard problem compared to the flat rate premium. Attempts by

[55] The four distinct design features of deposit insurance are; (i) the funding type, (ii) sources of funds, (iii) insurance premiums systems and (iv) the coverage limits and coinsurance.

previous researchers to investigate the relationship between bank risk taking (moral hazard problem) and the introduction of an explicit deposit insurance system have been inconclusive. Therefore, the need exists for understanding this moral hazard problem particularly in a dual banking system like Malaysia and ascertaining whether the moral hazard problem could be mitigated with an effective design of deposit insurance premium policy.

In this study, broadly, four empirical tests are performed. The first test of this thesis confirms the presence of moral hazard problem by way of an increase in bank risk in a dual banking system like Malaysia after the introduction of a formal deposit insurance protection. Thereafter, the second and third empirical analysis test the proposed hypothesis of significant difference in bank risk taking between the Islamic banks and conventional banks in Malaysia after the introduction of a deposit insurance system. These empirical analyses provide important new findings on the relationship between bank risk taking and deposit insurance in a dual banking system particularly the Islamic banks. The final empirical test evaluates the credibility or effectiveness of the insurance premium policy. The deposit insurance premium is credible when it is risk sensitive towards bank risk in the risk-based premium system. This is examined by identifying whether the risk-premium sensitivity improves in the risk-based premium assessment method and whether the magnitude of the annual premium paid is positively correlated with bank risk. The last empirical test offers new intuitiveness for regulators to incorporate the risk-based deposit insurance premium system as part of an effective design feature that mitigates the moral hazard problem.

The remainder of the chapter is structured as follows: the summary of findings on the association between bank risk and deposit insurance are highlighted in Section 6.2; the

sensitivity between bank risk and insurance premium system in a risk-based deposit insurance system are summarized in Section 6.3; the implications of the overall findings are addressed in Section 6.4; and a brief description of the limitations and future research directions is presented in Section 6.5.

6.2 Summary of Findings for Deposit Insurance and Bank Risk

This section summarizes the findings for the first two research objectives. The first objective is to investigate the presence of moral hazard by way of increased bank risk in the Malaysian banking system after the introduction of deposit insurance system. The second research objective is to evaluate and compare the risk taking behavior of conventional and Islamic banks after the introduction of deposit insurance system.

To achieve these two objectives of this research, six tenable hypotheses are developed in Chapter 3. The first two hypotheses expect a positive association between bank risk (financial risk and operational risk) with post deposit insurance system. The third hypothesis expects bank risk taking to increase in the conventional banks but it should not increase in the Islamic banks after the introduction of deposit insurance system. The concept behind these three hypotheses is that the study firstly investigates whether the moral hazard problem is present post deposit insurance in Malaysia. If moral hazard is present and supports Hypothesis 1 and Hypothesis 2, this study further explores whether there is a significant difference in bank risk taking post deposit insurance between the conventional and Islamic banks.

The third and fourth hypotheses establish that bank risk in the form of financial risk and operational risk increases after the implementation of deposit insurance system in the

conventional banks in Malaysia. Finally, the fifth and sixth hypothesis postulates that bank risk in the form of financial risk and operational risk increases in the Islamic banks in Malaysia after the introduction of deposit insurance system. The hypotheses and research design of the study are discussed in Chapter 3. The panel data for all banks sample and Islamic banks is unbalanced while the conventional banks sample is a balanced sample. Nine regression equations are estimated for investigating the first six hypotheses using three different sub-samples: one for all banks, one for conventional banks and one for Islamic banks. This study uses three different measures of bank risk namely credit risk, insolvency risk and operational risk apart from alternative models for robustness. The estimation is carried out in the dynamic panel framework. The System GMM is used because it is assumed based on the literature, to have the least biased estimator among other alternatives.

For the all banks sample, the main findings are that the bank risk in the form of insolvency risk and operational risk increased significantly after the introduction of a deposit insurance system. In contrast, the non-performing loan, the most direct measure of credit or asset risk decline after the introduction of deposit insurance in the all banks sample. Specifically, comparing the conventional and Islamic banks increase in risk, the moral hazard problem is only prevalent in the conventional banks. Hence, the findings support the Hypothesis 1, Hypothesis 2, Hypothesis 3 and Hypothesis 4 in Chapter 3. Interestingly, the dynamic panel estimates provide limited evidence for increase in bank risk taking in the Islamic banks indicating that the moral hazard problem is not present in the Islamic banks post deposit insurance. The findings cannot provide empirical support for Hypothesis 5 and Hypothesis 6 that bank risk in the form of financial risk and operational risk increases in the

Islamic banks in Malaysia after the introduction of deposit insurance system. Therefore, the findings differentiate the bank risk taking between the conventional and Islamic banks.

Overall it could be stated that, the findings in this thesis are consistent with findings of existing studies that the conventional banks increase risk taking after the introduction of deposit insurance. This study includes new empirical evidence in increase operational risk taking by the conventional banks after the introduction of deposit insurance system. In addition, it provides new insights into the different implications of deposit insurance on the Islamic banks risk taking. All the six hypothesis statements and the findings of the panel regression estimates are summarized in Table 6.1.

Table 6.1: Investigation Results of the Hypotheses on Bank Risk and Deposit Insurance

Hypothesis	**Details**	**Accept / Reject Hypothesis**
Hypothesis 1	Bank risk in the form of financial risk increases after the introduction of a deposit insurance system.	Accept
Hypothesis 2	Bank risk in the form of operational risk increases after the introduction of a deposit insurance system.	Accept
Hypothesis 3	Bank risk in the form of financial risk increases in the conventional banks after the introduction of a deposit insurance system.	Accept
Hypothesis 4	Bank risk in the form of operational risk increases in the conventional banks after the introduction of a deposit insurance system.	Accept
Hypothesis 5	Bank risk in the form of financial increases in the Islamic banks after the introduction of a deposit insurance system.	Fail to accept
Hypothesis 6	Bank risk in the form of operational risk increases in the Islamic banks after the introduction of a deposit insurance system.	Fail to accept

6.3 Summary of Findings for Risk-Premium Sensitivity and Bank Risk

This section summarizes the findings for the final objective of this research. The final objective is to ascertain whether the deposit insurance premium is sensitive towards bank risk in the risk-based premium system and in mitigating the moral hazard problem. In contrast to previous studies[56], this thesis not only investigates the sensitivity between bank risk and the risk-based assessment method but also examines the magnitude of association between the annual premium and bank risk. To achieve these objectives, two testable hypotheses are developed in Chapter 3. In this respective, Chapter 5 examines the most critical issues related to the risk-based deposit insurance design to mitigate the moral hazard problem, in an effort to guide policy makers in designing an effective deposit insurance system.

The findings, therefore, are based on a sample of mandatory member banks of deposit insurance protection scheme for a period of deposit insurance coverage i.e. 2006-2010. Contrary to expectations, the risk-premium sensitivity worsens in the risk-based premium assessment method. Thus, Hypothesis 7 cannot be accepted. Moreover, the empirical evidence reports that the magnitude of the estimated annual premiums paid by the banks is negatively related with the bank risk. This finding indicates that the annual premium is ineffective to mitigate the moral hazard problem as the premium is inadequate to cover for the increase in bank risk. Thus, the finding fails to support Hypothesis 8 that the magnitude of the annual premium is positively associated with the bank risk.

[56] Previous studies that investigate the relationship between bank risk and risk-based assessment method is based on a cross-countries study. Whereas, for the first time, this study uses a bank level data in the context of Malaysia to investigate the relationship in depth.

In addition, the study findings further establish that size matters as larger banks increase risk, they pay adequate premiums, whereas, the premiums paid by small banks do not commensurate with their increased risk profiles. These findings partly explain why big banks are usually the least enthusiastic to voluntarily become a member bank under a deposit insurance protection as the big banks are likely to pay hefty insurance premiums compared to the small banks. The findings also demonstrate that the small conventional banks have the incentive to increase risk in the risk-based deposit insurance system as the premiums paid by these banks are inadequate or do not commensurate with the increased risk. In a different twist, the risk-based deposit insurance system creates regulatory arbitrage for the small conventional banks to increase their risk taking as being small and risky, these banks are not penalized with higher premiums. Therefore, the implementation of the risk-based deposit insurance system in Malaysia aggravates the moral hazard problem especially in the small conventional banks instead of overcoming it. The premium should be designed to incorporate features to strengthen it to address such issues.

The two hypothesis statements and the findings of the dynamic regression test are presented in Table 6.2 below:

Table 6.2: Investigation Results of the Hypotheses on Risk-Premium Sensitivity and Bank Risk

Hypothesis	**Details**	**Accept / Reject Hypothesis**
Hypothesis 7	The risk-premium sensitivity significantly improves in the risk-based premium assessment method.	Fail to accept
Hypothesis 8	The magnitude of the annual premium paid is positively associated with the bank risk.	Fail to accept

It was argued in Section 2.2.3 and Section 2.3.5 that deposit insurance is here to stay despite the moral hazard problem. Specifically Section 2.3.5 postulates that a credible design features of deposit insurance system particularly the risk based deposit insurance premium could overcome the moral hazard problem. Notwithstanding this, the findings in Chapter 5 indicate that risk-based deposit insurance does not necessarily mitigate the moral hazard problem unless the risk-premium is sensitive towards bank risk. Hence, the Malaysian policy regarding the risk-based deposit insurance system that is currently in force is arguable effective to mitigate the moral hazard problem, which explains why banks increase their risk taking after the introduction of deposit insurance system.

6.4 Implications of the Findings

It is deliberated that a credible risk-based deposit insurance system will eventually promote prudent and sound risk management practices among the banks. On the contrary, a poorly designed deposit insurance system may affect the stability of the banking system. In this study, I found that moral hazard is present by way of increased risk taking in the Malaysian banking system after the implementation of deposit insurance. Following this, there is a significant difference in bank risk taking between the conventional and Islamic banks in Malaysia after the introduction of deposit insurance system. Given that, I then questioned the effectiveness or credibility of the risk-based deposit insurance system policy in mitigating this moral hazard problem.

This findings of this thesis could enable the Malaysian policymakers to evaluate whether deposit insurance escalates or retards risk-taking behavior by insured banks in addition to whether there is improvement in the sensitivity of risk-premium to bank risk. Such an

evaluation would enable policymakers to institute appropriate policy measures to counter risk taking behavior by banks. The contributions of this thesis towards knowledge and methodology are outlined in Section 1.7 of Chapter 1. This section outlines the implications of the study for literature and policy formulation by regulators like the Ministry of Finance, Central Bank and deposit insurance organizations as well as bankers. In the following sections, some of these implications are discussed.

6.4.1 Implications for the Literature

6.4.1.1 Risk-based Deposit Insurance System Not Necessarily Mitigate Moral Hazard Problem

The findings of this study indirectly evaluate the effectiveness of the risk-based deposit insurance system in Malaysia. It is apparent from the empirical evidence that the risk-based system replacing the flat rate system since 2008 is still an inferior policy to counter the moral hazard problem. The objective of regulators to migrate from the flat rate premium to risk-based premium scheme is to prevent banks from increasing their risk taking. However, the risk-based deposit insurance premium will only be effective in replacing the flat rate premium if the risk-premium sensitivity improves. However, this is not the case for the Malaysian risk-based deposit insurance system. The moral hazard problem is present in the form of increased bank risk after the introduction of the deposit insurance system because the premium is inadequate to cover the risk. In general, the findings do offer an insight to regulators that migrating from the flat rate to risk-based premium may not necessarily mitigate the moral hazard problem unless the premium coverage adequately covers the increase in risk.

6.4.1.2 Significant Difference in Bank Risk between the Islamic Banks and Conventional Banks Post Deposit Insurance

The introduction of deposit insurance system does not alter the risk exposure of the Islamic banks, as there is no change in the Islamic banks risk taking. Only the conventional banks alter their risk profiles after the introduction of deposit insurance. The conventional banks' objectives have always been seen as seeking higher profits and their bottom line considerations. High-risk investments will generate higher profits. Thus, the deposit insurance protection provides a protective buffer for the conventional banks to embark on risky investments as the deposit protection will partly cover their downside risks. On the other hand, the *Shariah* principles guided the Islamic banks to create value in their investments. Therefore, the Islamic banks will only consider a calculated risky investment that adds value not only to the borrower but also to the real economy.

6.4.1.3 Inadequate Risk-based Premium Provides Opportunity for Arbitrage

The current risk-based deposit insurance system in Malaysia allows regulatory arbitrage for the small conventional banks. The first part of the empirical study indicates that only the conventional banks increased their risk taking after the introduction of deposit insurance system. As such, the regulatory arbitrage is enjoyed only by the small conventional banks. If a small conventional bank increases risk, the bank only pays low premium which is inadequate to commensurate with the increase in risk.

6.4.2 Implications for the Policy

6.4.2.1 Bank Size Matters

The implications of this study for policy are to infer that the bank size matters in the annual premiums paid. The findings of this study suggest that big banks that have high risk pays adequate premium while at the same time small banks that have high risk profiles pay inadequate premiums. The findings of this study also offer a rationale on why the big banks are reluctant to participate in a deposit protection scheme if the participation is voluntary. In terms of policy, the measures for annual premium should differ between the small and big banks. The current measures for computing the annual premium are inadequate to cover the small banks. In a bigger picture, the small banks should be regulated more stringently.

6.4.2.2 Implementation of an Early Warning Mechanism

Risk-based deposit insurance premiums have been adopted by several deposit insurance agencies including the Federal Deposit Insurance Corporation (FDIC) and the Canada Deposit Insurance Corporation to mitigate the moral hazard problem. A credible deposit insurance system promotes financial stability, thus provides sound and stable environment for bank intermediation to support economic growth. The potential problem of moral hazard requires articulation to design credible deposit insurance schemes particularly the insurance premiums to rectify the moral hazard problem. Malaysia thus far, has no

incidences of bank runs. Nonetheless, given the reality that the financial crisis is cyclical in nature, it is vital to put in place a well-designed deposit insurance premium that is risk-premium sensitive as part of the existing financial safety net.[57] The ramifications of a financial crisis would impact more severely the small banks than the big banks as the premiums are inadequate to cover the small banks. In a financial crisis, the small banks normally fail. This situation asserts the importance to institute an early warning mechanism as part of the early intervention framework for the deposit insurer to step in when a bank faces failure.

6.4.2.3 Cross-Border Cooperation and Information Sharing

This thesis provides new evidence that operational risk taking increases in post deposit insurance period. Major operational losses caused by internal or external fraudulent activities or slack in internal controls, are often the common source of bank failures. The inclusion of operational risk as one of the pillars in Basel II was in response to the collapse of Barings Bank in 1995, which was recognized as the oldest (1762-1995) merchant bank in London. The collapsed was due to the lag and lapses in internal control of its personnel (Nick Leeson) and the processes involved. The collapse of a bank that was in operation for more than 200 years took the financial sector players by surprise. Barings suffered irreparable loss of $1.3 billion loss that was caused by rogue trading activities.

This anecdote highlights the fact that the conventional banks are constantly exposed to different kinds of operational risk. Operational losses of banks are more often passed on to their customers. This thesis resorts to management efficiency as a proxy for operational

[57] Section 1.3 describes the component of a financial safety net.

risk to include people as the essence of operational risk. Although operational risk is commonly perceived as firm or bank specific, the systemic component of its impact is growing in importance as evidenced by the 2007/2008 global financial crisis. Specifically, as the relationships among financial institutions in particular, the systematically important financial institutions located in different countries increase, operational disruptions are likely to lead to an increased market volatility and contagion across markets and countries. Hence, this necessitates a formal cooperation in particular on compensation frameworks and information sharing protocols between deposit insurance agencies and supervisory authorities in the region to deal more effectively with systemic bank failures.

6.4.2.4 Ethical Principles of Islamic Finance

The findings of this thesis raise the question on why Islamic banks do not adjust their risk after the introduction of the deposit insurance system unlike the conventional banks. This thesis suggests that compliance with *Shariah* principles prevent the Islamic banks from adjusting their risk post deposit insurance. Islamic financing amongst others prohibits investment in activities that have uncertainties (*gharar*) especially risk, interest (*riba*) and gambling (*maysir*) activities. In other words, these ethical principles are the compelling aspects of Islamic banking that could be also applied to conventional banking.[58] These important ethical fundamentals of Islamic finance inadvertently allows the Islamic banks' resources only to finance real assets rather than financial derivatives. On this front, this limits the Islamic banks' exposure to risk. Therefore, Islamic banks do not adjust their risk contrary to their conventional counterparts after the introduction of deposit insurance in Malaysia.

[58] To illustrate, the Gramen Bank applies many of these ethical principles of Islamic finance to alleviate poverty in Bangladesh. Professor Muhammad Yunus (the founder) won the 2006 Nobel Peace Prize.

Despite arguments forwarded especially by the efficient market school that deposit insurance system may not function as an effective safety net to prevent financial crisis; like the 2007/2008 global financial crisis, it could be concluded that deposit insurance is here to stay. Deposit insurance cannot prevent financial instability but it could buffer and insulate risks to minimize the effects. If financial instability other than bank runs causes bank failures, then to conclude that the deposit insurance system is ineffective is not correct. Bank failures may be caused by many other exogenous factors like bad economic environment, political instability or non-credible designs of existing deposit insurance systems that are more prone to banking instabilities. With the above in mind, it is suggested that policymakers should carefully consider design features for an effective risk-based deposit insurance system that is risk-premium sensitive to ensure financial stability.

6.5 Limitations and Future Research

Any research is prone to limitations. The limitations of this research could provide motivation and directions for future research. The main limitations and directions for future research of this study are deliberated in the following sections.

6.5.1 Limitations

1. This thesis employs only the accounting-based bank risk measures instead of the market-based measures. The market-based measures would greatly restrict the sample size. Out of the 18 Islamic banks, only one Islamic bank is listed on the stock exchange. Moreover, I do not want to lose the wealth of the Islamic banks' data that was included in this research. Therefore, the market measures of risk are

not considered in this study. This justifies only the accounting-based bank risk measures are employed in this research.

2. This study only looks into the impact of deposit insurance on three different types of risk namely credit risk, insolvency risk and operational risk. Banks cannot function without taking risks. Other types of risk include market risk, legal risk and liquidity risk. Therefore, other types of risks could be tested in future research.

3. This research context is narrow as the sampling frame is only limited to Malaysia. Notwithstanding this, the research provides greater depth in understanding the moral hazard problem in a dual banking system like Malaysia and assessing whether the risk-based deposit insurance premium is sensitive to bank risk (credible) to overcome the moral hazard problem after the introduction of deposit protection scheme. From the literature, it is noted that Malaysia is the only country with a dual banking system that has both conventional and Islamic deposit insurance system that coexists but administered separately. Furthermore, Malaysia has the most number of Islamic banks operating in a dual banking system in the region and adopts the risk-based deposit insurance premium instead of the flat-rate premium. Coincidentally, the incomplete financial data for the Islamic banks in Bankscope are available in the financial reports for the Islamic banks in Malaysia unlike other countries. Hence, Malaysia is an ideal context for this thesis to investigate in-depth the relationship between deposit insurance and bank risk in a dual banking system as well as the credibility of the deposit insurance premium to overcome the moral hazard problem.

4. It is important to note that the measurement attracts estimation errors. Hence, the results have to be interpreted in a broader context.

6.5.2 Future Research

1. Future research could extend the context of investigation to other country specific studies. Over time, an in-depth comparative study could be done to compare and contrast the design features of an effective deposit insurance for financial stability.

2. This study differentiates and explains the moral hazard implications from the perspective of the bank i.e. the risk taking behavior of both the conventional and Islamic banks. Accordingly, a follow-up study is required to assess the effectiveness of deposit insurance in instilling depositors' confidence. The stability of the banking system is heavily reliant on and influenced by the level of depositors' confidence in the system. Loss of depositors' confidence could trigger a contagion effect, which could affect even the healthy banks. Depositors' confidence is essential for financial intermediation.

3. Another area of research that can be considered is to determine whether depositors in a dual banking system exercise market discipline in the presence of deposit insurance.

However, it has to be acknowledged that the limitations listed above do not devalue the importance of the research findings that provide direction for future research. Looking ahead, the topic of deposit insurance certainly offers abundant opportunities for future

research. Ideally, such research should focus on the effective design features of deposit insurance, namely the deposit insurance premium to mitigate the moral hazard problem.

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